# DOES PRICE DISCRIMINATION INTENSIFY COMPETITION? IMPLICATIONS FOR ANTITRUST

JAMES C. COOPER
LUKE FROEB
DANIEL P. O'BRIEN
STEVEN TSCHANTZ*

## I. INTRODUCTION

As a general proposition, antitrust law is hostile to price discrimination. This hostility appears to derive from a comparison of perfect competition (with no price discrimination) to monopoly (with price discrimination). Most of the real world, however, does not fit neatly into either of these polar extremes, which is why most industrial organization economists prefer models of oligopoly. Importantly, economists have known for some time that some forms of price discrimination by oligopolists yield different welfare outcomes than price discrimination by a monopolist. There is now a considerable economic literature on oligopoly price discrimination, but to our knowledge its implications for antitrust analysis have yet to receive attention.[1] This article focuses on the antitrust implications of price discrimination based on consumer location by spatial

[1] A very up-to-date survey of the economics literature is contained in Lars A. Stole, *Price Discrimination Without Monopoly, in* HANDBOOK OF INDUSTRIAL ORGANIZATION (Mark Armstrong & Robert Porter eds., forthcoming 2005). Two recent articles provide excellent analyses of the error in inferring market power from the presence of price discrimination in oligopoly markets. These article both correctly point out that firms in even the most competitive environments likely face downward-sloping demand curves and, thus, have the ability to price discriminate. *See* Benjamin Klein & John Shepard Wiley Jr., *Competitive Price Discrimination as an Antitrust Justification for Intellectual Property Refusals to Deal*, 70 ANTITRUST L.J. 599 (2003); William J. Baumol & Daniel G. Swanson, *The New Economy and Ubiquitous Competitive Price Discrimination: Identifying Defensible Criteria of Market Power*, 70 ANTITRUST L.J. 661 (2003). The focus of this article, however, is the antitrust implications of the result that price discrimination can intensify competition in some very common cases.

327

competitors that, in contrast to monopoly price discrimination, lowers prices for all consumers.

Spatial competitors, like most firms in the real world, sell products that are differentiated from those of their rivals. The products of spatial competitors are differentiated in their physical location or in their products' attributes. Some consumers are closer to one firm while others are closer to another—either physically or in product space where distance measures the degree to which the attributes of various firms' products match those preferred by the consumer. Firms that sell differentiated products have downward-sloping demand curves and, depending on entry conditions, may make either normal or supranormal profits.

Firms facing downward-sloping demand curves may be able to take advantage of differences in the price sensitivities of various groups of customers by charging them different prices. Spatial competitors often offer prices to consumers that differ with a consumer's distance from the firm when they can identify consumers' location and consumers cannot arbitrage the price differences. A spatial competitor that had been charging uniform prices and suddenly was able to price discriminate would have an incentive to lower prices for consumers in their "weak" markets and raise them for consumers in their "strong" markets, holding constant the prices of its competitors. This is similar to the familiar result of price discrimination by a monopolist: some consumers pay higher prices and some lower prices.

For competing firms, unlike a monopolist, this is not the end of the story because the prices of their rivals are not fixed. Rivals also will have an incentive to price discriminate, and competing firms must react to each other's pricing changes. In an important class of spatial models and many real-world markets, the consumers to whom one firm would like to raise price—its strong market—are another firm's weak market to which it would like to lower price.[2] When this "best-response asymmetry" exists, the equilibrium outcome of spatial competitors reacting to each other's discriminatory price reductions may be lower prices for all consumers and lower profits for all firms, compared to an equilibrium in

---

[2] This condition is known as "best-response asymmetry," a name that refers to each firm's best-response function to its rivals' prices $p^i(p^{-i})$. When firms have best-response symmetry, they agree on which markets are "weak" and which are "strong." Each firm would prefer to set a higher price to the same "market" (group of customers) for any given uniform price charged by the other firm. In contrast, firms with best-response symmetry disagree about which markets or customers they prefer to charge higher (and lower) prices, given a uniform price charged by the other firm. *See* Kenneth S. Corts, *Third-Degree Price Discrimination in Oligopoly: All-Out Competition and Strategic Commitment*, 29 RAND J. ECON. 306 (1998).

which all firms offer uniform pricing to all consumers.[3] For the remainder of the article, we refer to the type of discrimination that leads to this equilibrium outcome as competitive spatial price discrimination (CSPD).

It is important to note from the outset that the analysis of this article does not apply to all types of price discrimination. First, a necessary condition for CSPD to obtain is that each firm's strong market is at least one other firm's weak market, and vice-versa. Thus, CSPD should be distinguished from another common sort of price discrimination that arises when firms agree on which consumers groups are strong markets and which are weak markets.[4] The latter situation results in discrimination in the form of pricing strategies, such as movie discounts for students, early-bird dinner specials, and higher airfares for business travelers, and does not necessarily result in more intense competition than uniform pricing (although it too occurs frequently in highly competitive markets).[5] When firms agree on which customers are strong markets (and which are weak markets), all firms have an incentive to offer higher prices to the same group of customers. With such price discrimination, price cuts are not designed to steal consumers away from rival firms, but instead are designed to attract marginal consumers into the market in the first place.

Second, disagreement over strong and weak markets is not a sufficient condition for CSPD to obtain.[6] Depending on the underlying set of consumer preferences, spatial price discrimination may lead to higher prices for some, or even all, consumers. That said, our analysis is likely to be relevant to an important set of market structures. For example, Thisse and Vives have shown that CSPD holds in a Hotelling model of product differentiation.[7] Additionally, in Parts II and III we show how consumer preferences underlying an extension of the linear-city model of product differentiation and a more complex square-city model also can give rise to CSPD.

Spatial price discrimination is quite common when consumers have brand or locational preferences and firms can target price cuts at con-

---

[3] Indeed, in circumstances where market conditions lead to such an equilibrium outcome, if the antitrust laws did not forbid it, firms would increase their profits by agreeing to set uniform, nondiscriminatory prices (even if they did not agree on the level of the uniform price).

[4] This condition refers to "best-response symmetry."

[5] These forms of price discrimination also can arise when best-response asymmetry holds. *See* Corts, *supra* note 2.

[6] *See id.*

[7] *See* Jacques-Francois Thisse & Xavier Vives, *On the Strategic Choice of Spatial Price Policy*, 78 AM. ECON. REV. 122 (1988); *infra* Part II. In the basic Hotelling model, two firms

sumers who prefer a rival brand or location. For example, firms often discriminate through coupon targeting. Supermarkets may circulate coupons in geographic areas closer to their rivals or issue coupons at the checkout counter to customers known to live closer to rivals.[8] Some companies offer coupons at supermarket checkouts to customers who have purchased competing brands.[9] Domino's Pizza reportedly targets promotions to customers who are located closer to its rivals' stores, a strategy consistent with discrimination based on consumer location.[10] Similarly, long-distance phone service providers sometimes offer lower prices to their competitors' customers.[11] In all such cases we would expect rivals to react by offering lower prices to these targeted customers, with the result that equilibrium prices are closer to costs than they would be absent this competition of targeted price reductions.

The conclusion that spatial price discrimination can intensify competition is not new in the economics literature. Over fifteen years ago, for example, Thisse and Vives showed for spatial competitors that, "[c]ontrary to general belief, uniform (FOB) pricing is therefore *not* evidence of a more competitive environment."[12] This led the authors to make the following "not totally surprising" observation:

> [D]enying a firm the right to meet the price of a competitor on a discriminatory basis provides the latter with some protection against price attacks. The effect then is to weaken competition, contrary to the belief of the proponents of naïve application of legislation prohibiting price discrimination like the Robinson-Patman Act in the United States,

---

located at opposite ends of a street sell a homogeneous product and compete for consumers who are uniformly distributed along the street.

[8] Retail scanner data and company loyalty programs sometimes make such discrimination possible. For a detailed analysis of these strategies, *see* Greg Shaffer & Z. John Zhang, *Competitive Coupon Targeting*, 14 MKTG. SCI. 395 (1995).

[9] Examples of these so-called "pay-to-switch" strategies include Coca-Cola giving a discount on Diet Coke to purchasers of Diet Pepsi, and Chesebrough Pond giving a discount on Mentadent Toothpaste to purchasers of PeroxiCare. *See* Greg Shaffer & Z. John Zhang, *Pay to Switch or Pay to Stay: Preference-Based Price Discrimination in Markets with Switching Costs*, 9 J. ECON. & MGMT. STRATEGY 397, 400 (2000).

[10] *Id.*

[11] *See id.* at 399 (noting how AT&T and MCI will offer cash payments to induce customers to switch services); *see also* Yongmin Chen, *Paying Customers to Switch*, 6 J. ECON. & MGMT. STRATEGY 877 (1997); Drew Fudenberg & Jean Tirole, *Customer Poaching & Brand Switching*, 31 RAND J. ECON. 634 (2000). Discrimination based on consumers' spatial positioning also may take place in vertically differentiated settings. For example, private-label or generic firms may offer "choosy" customers a discount on their product, and at the same time branded firms may offer discounts on their products to consumers with lower valuations of quality. *See* Corts, *supra* note 2.

[12] Thisse & Vives, *supra* note 7, at 124. *See also* Dennis W. Carlton, *A Reexamination of Delivered Pricing Systems*, 26 J.L. & ECON. 51 (1983).

or similar recommendations of the Price Commission in the United
Kingdom.[13]

More recently, Kenneth Corts has developed the analysis of how price
discrimination by competing oligopolists can intensify competition.[14]
Our goal in this article is to introduce this important learning into
antitrust policy. We identify three areas of antitrust that could benefit
from this economic insight.

First, we discuss in Part III the implication of CSPD for analyzing the
competitive effects of mergers. Enforcement agencies and courts have
pointed to evidence of price discrimination as further reason for a trans-
action to be suspect. We show, however, that the unilateral price effects
of a merger of spatial competitors can be smaller when firms price
discriminate than when they set uniform prices. This finding is consistent
with the well-established principle in antitrust that mergers are less likely
to harm competition when more competition remains post merger.
When price discrimination intensifies competition, it may attenuate
merger effects.

Second, we discuss in Part IV the implications of CSPD for the antitrust
practice of using price discrimination to prove the existence of market
power. The reasoning behind this practice appears to be that perfectly
competitive firms set price equal to marginal cost, and price discrimina-
tion yields prices above marginal cost; therefore, a firm able to price
discriminate must possess market power. Firms in most markets, however,
produce differentiated products that are imperfect substitutes, allowing
each firm some "market power" in the trivial sense that it does not lose
all of its sales by raising price above marginal cost. This may give firms
the ability to charge different prices to different customers, but it is
inappropriate to draw inferences about a firm's ability to affect the
competitiveness of a market simply from the observation of whether it
can price discriminate.

Recognition that price discrimination can and does exist in highly
competitive environments in which most firms face a downward-sloping
demand curve but still have no ability to affect market-wide competition
is not novel.[15] That CSPD represents more intense price competition

---

[13] Thisse & Vives, *supra* note 7, at 134.

[14] *See* Corts, *supra* note 2.

[15] *See, e.g.,* Klein & Wiley, *supra* note 1; Baumol & Swanson, *supra* note 1; 2A PHILLIP E.
AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 517c4 (2d ed. 2002); *In re* Brand
Name Prescription Drugs Antitrust Litig., 186 F.3d 781, 786–87 (7th Cir. 1999). Relatedly,
Carlton has shown how according antitrust liability for unilateral refusals to deal that
facilitate price discrimination would be misguided because price discrimination can be a
way for firms to compete for large buyers. Dennis W. Carlton, *A General Analysis of Exclusion-*

than uniform pricing, however, has important implications for the costs of erroneously inferring market power from price discrimination.

Third, as we discuss in Part V, our model has implications for enforcement of the Robinson-Patman Act (RP).[16] Under RP, a defendant can be held liable directly for engaging in certain types of price discrimination. Perhaps one reason why RP has survived sustained criticism for being a competitor-protection statute is that the welfare effects of eliminating monopoly price discrimination are ambiguous.[17] The welfare effects of deterring CSPD, however, are not ambiguous: deterrence of CPSD unambiguously harms consumers. In fact, to the extent that RP induces oligopolists to choose uniform pricing rather than spatial price discrimination, it helps them achieve the outcome they would choose jointly if the antitrust laws allowed such collusion. Therefore, our findings add weight to the already substantial criticism of the Robinson-Patman Act.

## II. PRICE DISCRIMINATION AMONG SPATIAL COMPETITORS

We illustrate price discrimination by spatial competitors with a simple example of competition between three spatially differentiated oligopolists. Spatial competition does not cover all cases, but it is an important special case relevant to many real-world market settings. Spatial competition allows the analysis of price discrimination based either on location

---

*ary Conduct and Refusal to Deal—Why* Aspen *and* Kodak *Are Misguided*, 68 ANTITRUST L.J. 659, 665 (2001).

[16] 15 U.S.C. §§ 13–13b, 21a.

[17] An old result in economics is that third-degree price discrimination by a *monopolist* typically benefits some customers and harms others. The net welfare effects of introducing or eliminating such price discrimination, relative to a uniform monopoly price, are theoretically indeterminate. *See* JOAN ROBINSON, ECONOMICS OF IMPERFECT COMPETITION (1933). This result does not necessarily hold for monopoly price discrimination in intermediate good markets, *see* Michael Katz, *The Welfare Effects of Third-Degree Price Discrimination in Intermediate Good Markets*, 77 AM. ECON. REV. 154 (1987), or when prices are negotiated, *see* DANIEL P. O'BRIEN, THE WELFARE EFFECTS OF THIRD DEGREE PRICE DISCRIMINATION IN INTERMEDIATE GOOD MARKETS: THE CASE OF BARGAINING (FTC Working Paper No. 245, 2002). For a survey of the literature on monopoly price discrimination, *see* Hal Varian, *Price Discrimination, in* HANDBOOK OF INDUSTRIAL ORGANIZATION (Richard Schmalensee & Robert D. Willig eds., 1989). Further, third-degree price discrimination by a monopolist is inefficient because it leaves opportunities for arbitrage among consumers unexploited. In technical terms, price discrimination across any two consumers causes them to have different marginal rates of substitution (MRS) between the discriminating good X and some other product Y. In this case, consumers could both benefit if the consumer with the higher MRS of X for Y traded one unit of Y for one unit of X with the other consumer. In economic language, the allocation that results from price discrimination is not Pareto efficient, because some gains from trade are left unexploited.

or on consumer tastes, so long as preferences over choices are ordered in a particular way (as discussed later).
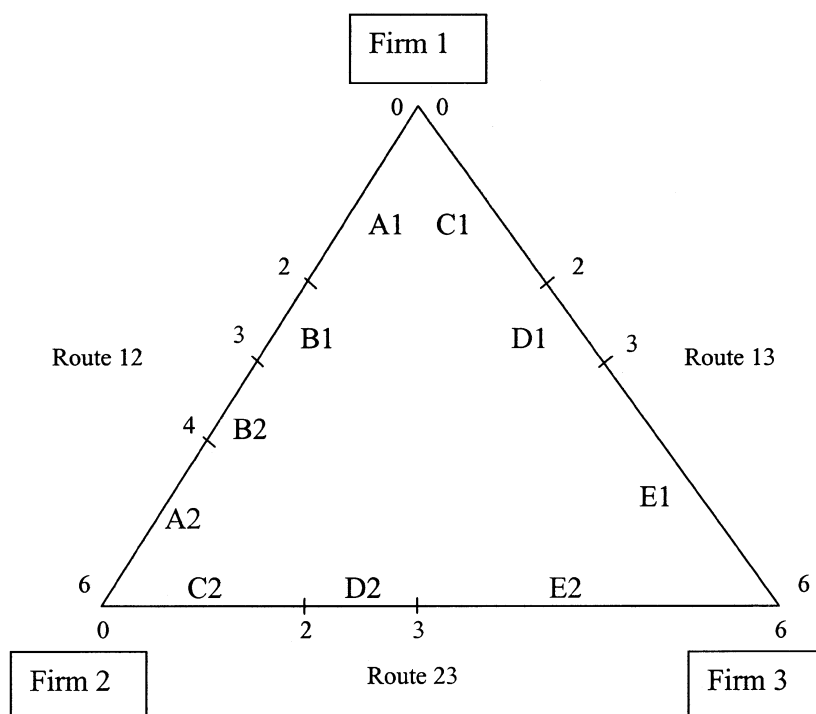
The market in our example is illustrated in Figure 1.[18]



**Figure 1. A Market with Spatially Differentiated Firms**

This example is a variant of the spatial model of competition first explored by Hotelling.[19] Three firms are located at the corners of an equilateral triangle with sides of length 6.[20] Each firm sells a single

---

[18] Firms can be differentiated along several dimensions. For example, a firm may be differentiated from its competitors with respect to the distance it is from consumers. The same firms also may be horizontally differentiated if they produce brands of similar quality but consumers do not agree on which brands they prefer. Alternatively, firms also can be vertically differentiated if they produce goods of differing quality and consumers agree on the quality ranking. We discuss the implications of situations where differentiation exists in two dimensions in our analysis of the "square city," *infra* Part III.D.

[19] *See* Harold Hotelling, *Stability in Competition*, 39 ECON. J. 41 (1929).

[20] Hotelling's model considered competition between two firms located on a line. This idea was generalized to multiple firms located on a circle by Steven C. Salop, *Monopolistic Competition with Outside Goods*, 10 BELL J. ECON. 141 (1979); and Dennis R. Capozza & Robert Van Order, *A Generalized Model of Spatial Competition*, 68 AM. ECON. REV. 896 (1978).

product labeled 1, 2, or 3 according to the firm that sells it. Customers are uniformly distributed along the sides of the triangle. One interpretation of this market is that it represents a triangular city with three roads connecting the locations of the three firms. For example, the firms might be competing supermarkets located on the north, southeast, and southwest ends of the city. Route 12 connects Firms 1 and 2, Route 13 connects Firms 1 and 3, and Route 23 connects Firms 2 and 3. The distance between adjacent sellers is six miles, and customers are equally spaced along each road.

The numbers on the outside of the diagram are mile markers. The markers on Routes 12 and 13 show distances from Firm 1, and the markers on Route 23 show distances from Firm 2. The labels inside the triangle (e.g., A1, B1, etc.) identify groups of customers in different regions; these can be thought of as customers in different suburbs or neighborhoods in the geographic interpretation of the example. For example, customers on Route 12 within two miles of Firm 1 are in suburb A1. This labeling is used later to discuss discriminatory pricing to groups of customers at different locations.

In the geographic interpretation, the distance from a customer to each seller reflects the travel cost (gasoline, vehicle wear and tear, time, etc.) the customer incurs when it purchases from that seller. If the travel cost is $t$ per mile, then the cost of traveling to purchase from a seller located $d$ miles away is

$$Travel\ Cost = \$(t \times d). \tag{1}$$

An alternative interpretation is that the relative positions of firms' products and consumers in "product space" indicate how closely the brands of the firms match the preferences of various consumers. The greater the distance between a customer and a seller, the greater the disutility the customer incurs by purchasing the product offered by that seller instead of the customer's most preferred product.[21] A customer's most preferred product would be located at the same point on the line as the customer. For example, each firm might produce a different genre of music or literature, or a different type of cereal, and each consumer's location represents their ideal book, CD, or cereal. For ease of exposition, we will carry on with the geographic interpretation of the model, but

---

Our example is a special case of the models considered by Salop and Capozza and Van Order with the number of firms fixed at three. Price discrimination in the spatial model has been examined by Thisse and Vives, *supra* note 7, among others. *See* Stole, *supra* note 1, and the references therein.

[21] In this interpretation, travel cost $(t \times d)$ is the monetary compensation needed to make the consumer indifferent between consumer products at various locations.

will sometimes focus on the consumer tastes interpretation when discussing the antitrust implications of our results.

By adding information about costs and consumer preferences to this model, one can analyze what products consumers will purchase and the prices they will pay. Suppose that each firm can produce at a constant unit cost of $c$. Suppose that each customer demands one unit of the product, is willing to pay at most $v$ for any one of the three products, and has travel costs equal to $t$ per mile. We assume that the customer valuation $v$ is high enough relative to the unit cost $c$ and the transport cost $t$ that all consumers will buy the product in equilibrium.

The products of the three firms are equally valuable to each consumer—each is worth $v$—except for the travel distance to the firm. In other words, all customers view the firms as differentiated from each other only because of their locations. Since all products provide the same value, each consumer will purchase whichever firm's product has the lowest *full price*, where the *full* price includes the price the firm charges for the product plus the cost to the consumer of traveling to the store to purchase and transport the product.

Each firm will face a downward-sloping demand for its product because a small increase in price will cause it to lose only those customers that are close enough to other firms to make switching suppliers worthwhile. Each firm has some "market power," as economists define this term, because it profitably can raise price above marginal cost without losing all of its customers. It is also the case that the same customers that incur the lowest total costs from consuming from Firm 1 incur the highest total costs from consuming from Firms 2 or 3. Thus, Firm 1's strong markets—for example, customers at A1 or C1—are weak markets for Firms 2 and 3, and vice-versa.[22]

## A. UNIFORM PRICING

We first examine the intensity of competition and equilibrium prices in this market if firms do not price discriminate and do not collude. This is a standard model of spatial competition, for which the most-widely accepted equilibrium concept is a Nash equilibrium in prices. Prices represent a Nash equilibrium only when each firm is pricing optimally to maximize its profits given its rivals' prices. Nash equilibrium prices have the property that no single firm can benefit by unilaterally altering its price, which is what makes these prices an "equilibrium."[23]

---

[22] This condition is best-response asymmetry, as discussed *supra*.

[23] Our model is "static" in the sense that it does not address the possibility that firms may tacitly coordinate their behavior by credibly threatening price wars or other punishment

We label the equilibrium uniform price each firm would charge if it did not price discriminate $P^{Uniform}$. The Appendix explains the steps required to determine this price. In this example, the uniform price works out to be cost plus a mark-up that depends on consumer travel costs:

$$P^{Uniform} = c + 6t.\text{[24]}\tag{2}$$

Notice that the uniform price exceeds each firm's marginal cost $c$ as long as the travel cost $t$ is positive. Economists typically define market power as the ability of firms to charge a price in excess of marginal cost, and sometimes measure market power by the Lerner index or economic margin: the profit per unit sold divided by the price. With uniform pricing, the margin in this example is

$$Margin^{Uniform} = \frac{P^{Uniform} - c}{P^{Uniform}} = \frac{6t}{c + 6t}.\text{[25]}\tag{3}$$

Table 1 presents margins for different values of the marginal cost $c$ and the travel cost $t$ using formula (3).

Perfect competition requires that price equal marginal cost, or that economic margins equal zero. This occurs here only when travel costs

**Table 1**
**Margins for Different Values of Unit Cost and Travel Cost**
**Under Uniform Pricing**

| Unit Production Cost c | Travel Cost (t) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $0.00 | $0.10 | $0.25 | $0.50 | $1.00 | $1.50 | $2.00 | $2.50 | $5.00 | $10.00 |
| $0.10 | 0% | 86% | 94% | 97% | 98% | 99% | 99% | 99% | 100% | 100% |
| $0.25 | 0% | 71% | 86% | 92% | 96% | 97% | 98% | 98% | 99% | 100% |
| $0.50 | 0% | 55% | 75% | 86% | 92% | 95% | 96% | 97% | 98% | 99% |
| $1.00 | 0% | 38% | 60% | 75% | 86% | 90% | 92% | 94% | 97% | 98% |
| $1.50 | 0% | 29% | 50% | 67% | 80% | 86% | 89% | 91% | 95% | 98% |
| $2.00 | 0% | 23% | 43% | 60% | 75% | 82% | 86% | 88% | 94% | 97% |
| $2.50 | 0% | 19% | 38% | 55% | 71% | 78% | 83% | 86% | 92% | 96% |
| $5.00 | 0% | 11% | 23% | 38% | 55% | 64% | 71% | 75% | 86% | 92% |
| $10.00 | 0% | 6% | 13% | 23% | 38% | 47% | 55% | 60% | 75% | 86% |

strategies. The implications of spatial price discrimination for tacit collusion are beyond the scope of this article. For a discussion of this issue, see Carlton, *supra* note 12.

[24] Symmetric demand and cost conditions for each firm mean that the equilibrium uniform price is the same for all firms.

[25] We follow the convention of stating decimal amounts (e.g., 0.50) in percentage terms (e.g., 50%).

equal zero, in which case firms' products are undifferentiated because customers incur zero travel costs regardless of which product they purchase. This confirms the well-known result that price competition between undifferentiated firms that are not capacity constrained yields the perfectly competitive outcome. When travel costs are positive, firms are differentiated, and their margins will also be positive. The higher the travel cost for any given production cost, the greater is the margin and the greater is the departure from perfect competition. The intuition is that the greater the travel cost, the greater the degree of differentiation between firms' products. For sufficiently high travel costs, each firm is a monopolist.

Below we compare consumer welfare (or consumer surplus) when firms cannot price discriminate with consumer welfare when all firms can discriminate. This comparison requires a measure of consumer welfare. Each consumer's welfare equals the consumer's valuation of the product ($v$) minus the full price, which includes both the price the firm charges and the travel cost. Since all products are worth the same $v$ to all consumers and all firms charge the same price, each consumer will buy from the nearest firm because its product will have the lowest full price. The travel cost for a consumer located $d^*$ miles from the nearest firm is $t \times d^*$. Thus, the full price paid by a consumer located $d^*$ miles from the nearest firm under uniform pricing is

$$P_{Full}^{Uniform} = c + 6t + td^*. \tag{4}$$

Since each consumer's welfare varies one-for-one with price (i.e., a $1 increase in price causes a $1 reduction in consumer welfare), we can measure changes in welfare by changes in the full price paid by the consumer.

## B. The Effects of Price Discrimination

Next, we examine how prices change when firms can price discriminate by charging different consumers different prices. In this example, we assume that firms can price discriminate based on each consumer's location.[26] This requires that firms be able to identify the location of their customers and that customers find it too costly to engage in arbitrage. Though in reality firms may not be able to price discriminate so

---

[26] Our analysis of price discrimination is similar in spirit to the analysis of Thisse & Vives, *supra* note 7. The main differences are: (a) Thisse and Vives examined a duopoly, whereas we examine a triopoly; and (b) they considered more general cost and demand structures than we do. In Part III we examine the effects of a merger with and without price discrimination, while they focused solely on issues relating to price discrimination.

precisely, examples of discrimination by spatial competitors based on consumer location and preferences are not hard to find.[27]

To understand the firms' incentives to price discriminate, consider the example of Figure 1, and assume firms have a marginal cost of $c = \$2$ and travel costs are $t = \$1$ per mile. If the firms cannot price discriminate, the analysis above tells us that each firm will charge a non-discriminatory price of $P^{Uniform} = \$8$ [$= c + 6t$]. When Firm 1 charges $P^{Uniform} = \$8$ (as do the other firms), it will sell only to those customers located closer to its store than to its competitors' stores: those in regions A1, B1, C1, and D1 in Figure 1.

If Firm 1 can price discriminate, it can increase its profits by continuing to charge $8 to customers to whom it already is selling, while setting a lower price to attract customers located farther away. For example, customers on the southern edge of region B2 are four miles from Firm 1 (refer to Figure 1) and only two miles from Firm 2. With uniform pricing, they buy from Firm 2 and pay a full price of $10 [$= P^{Uniform} + (t \times d)$]. Since Firm 1 can produce the product at a marginal cost of $2, it can make a profitable sale to this consumer by setting a price above its costs of $2 that also offers the customer a *full* price less than $10. Suppose Firm 1 offers this customer a price of $P = \$5$. If the customer buys from Firm 1, it will pay $5 plus the travel cost of $4, for a full price of $9. Since this is less than the $10 full price the customer was paying to buy from Firm 2, the offer by Firm 1 will attract this customer (so long as Firm 2's price remains $8) and increase Firm 1's profits by $3 [$= P - c$]. The customer's surplus also will increase by $1, the reduction in the full price paid. Both Firm 1 and consumers are better off. This establishes that, if Firms 2 and 3 each charge the equilibrium uniform price of $8, Firm 1 has an incentive to price discriminate in selling to the customer on the southern edge of suburb B2. A similar argument shows that Firm 1 would benefit by using price discrimination to compete for all customers on Routes 12 and 13.

Price discrimination gives Firm 1 the flexibility to go after customers that it would not attempt to attract if it were required to charge a uniform price. If Firm 1 could not price discriminate, it would have to lower prices to all customers to attract customers in region B2, which would not increase profits. With price discrimination, however, Firm 1 can try to attract these customers without reducing price to its other customers. Thus, price discrimination increases Firm 1's incentive to compete for sales to customers located in suburb B2. Of course, if Firm 1 can price

---

[27] *See supra* notes 8–11 and accompanying text.

discriminate, it also would have an incentive to raise prices to customers in its strong market—if its rivals did not change their prices. If Firms 2 and 3 continued to charge $8, Firm 1 could raise its prices to nearby customers at A1 and C1 above $8 without losing their business.

Firm 1's competitors, however, will not stand idly by and watch Firm 1 use price discrimination either to capture their customers or to pad its profits. If price discrimination is possible, they also have incentives to price discriminate both to retain their customers and to attempt to attract their rivals' customers. To understand what happens when all firms price discriminate, we have to look not only at firms' individual pricing incentives but also at competitive interactions.

If each firm can price discriminate to all customers by location, competition at each location effectively becomes an auction between the two firms closest to that location. The outcome of each auction is fairly simple to describe. Consider again the customer located on the southern edge of region B2, two miles from Firm 2 and four miles from Firm 1. Firm 2 is in the best position to win the sale to this customer because it is closest, but Firm 1, the second closest firm, is willing to bid as low as its marginal cost to attract this customer; a "win" at any price above marginal cost adds to its profits. In the numerical example, Firm 1 is willing to set a price as low as $2, its marginal cost, which would result in a full price for the customer from Firm 1 of $6 [= $c + (t \times 4)$ with $t = \$1$]. Therefore, Firm 2 must offer the customer a full price slightly less than $6 in order to outbid Firm 1 and retain this customer. The travel cost from the customer to Firm 2 is $2 (= $1 \times 2$), so Firm 2 must charge a price slightly less than $4 to win the sale. Firm 2 is willing to do this because its marginal cost is only $2.

The logic in the preceding paragraph, which comes from auction theory, determines the price that each consumer will pay when all three firms in this example can price discriminate by location.[28] Each consumer buys from the closest firm that can profitably offer the lowest full price, because all firms have the same marginal cost of production and travel costs to it are lowest. The price paid by each consumer is determined by the lowest price that the second most-preferred bidder can offer profitably. A customer located $d^*$ miles from the closest firm will be located $6 - d^*$ miles from the next closest competitor. Since the second closest competitor is willing to bid a price as low as its marginal cost $c$, the lowest full price it will offer a customer is $\$c + t(6 - d^*)$. If the customer buys from the nearest firm at price $P$, it pays a full price of

---

[28] *See, e.g.,* Philip Crooke et al., *Merger in Sealed Versus Oral Auctions,* 7 INT'L J. ECON. BUS. 201 (2000).

$P + td*$. To win the sale, the firm closest to the customer must meet the best full price that the second closest firm is willing to offer. This means that the nearest firm must choose a price no greater than the price $P$ that solves $P + td* = c + t(6 - d*)$. Solving this equation for $P$ gives the discriminatory price that will be charged to a customer located $d*$ miles from the nearest firm:

$$P^{Disc} = c + 6t - 2td*. \tag{5}$$

The full price paid by a customer located $d*$ miles from the nearest firm is equal to $P^{Disc}$ plus the transport cost $td*$. Adding $td*$ to the price in (5) gives a full price of

$$P^{Disc}_{Full} = c + 6t - td*. \tag{6}$$

We can now compare the full price paid by each customer under discrimination (equation 6) with the full price paid under uniform pricing (equation 4). Subtracting the uniform price from the discriminatory price, the difference in price is

$$P^{Disc}_{Full} - P^{Uniform}_{Full} = c + 6t - 2td* - (c + 6t + td*) = -td*. \tag{7}$$

Equation (7) shows that customers located $d*$ miles from the nearest firm gain $2td*$ (i.e., the full price falls by $2td*$) from price discrimination. In this example, *every* consumer except those located right next to the store (who have travel costs $d = 0$) benefits from price discrimination.

In this numerical example, with $c = 2$ and $t = 1$, the margin above cost with uniform pricing is 75 percent [$= 6/(2 + 6)$, using equation 3]. This is a substantial margin, so perhaps it is not surprising that firms have incentives to price discriminate in this case. However, the incentive to price discriminate in this environment remains even when the market is intensely (albeit not perfectly) competitive.

For example, suppose travel costs are $.10 per mile (rather than $1). Absent price discrimination, firms charge a uniform price of $2.60 (from equation 4), and earn a margin of 23 percent ($= .60/2.60$, using equation 3). This margin is smaller than the margins observed in many markets for consumer products that are considered highly competitive. Now consider Firm 1's incentive to price discriminate. A consumer located on the southern edge of region B1 pays a full price of $2.80 (from equation 4) to purchase the product from Firm 2, which is two miles away. The travel cost from this customer to Firm 1 is $.40. Thus, Firm 1 can undercut the full price of $2.80 from Firm 2 and attract this customer with any price less than $2.40. Since $2.40 exceeds Firm 1's marginal cost of $2, it will have an incentive to price discriminate to attract this customer. If both firms price discriminate, competition from

Firm 1 will force Firm 2's price down to $2.20 in order to match the lowest full price of $2.40 that Firm 1 can profitably offer this customer. Carrying this analysis to its logical conclusion, all firms will price discriminate in equilibrium if they are able to do so, and prices will be lower than they would be in the absence of price discrimination.

When spatial competition results in CSPD, price discrimination based on consumer location intensifies competition between the firms, causing prices to fall for all consumers and profits to fall for all firms. The intuition behind this result is that price discrimination makes the location of each customer a competitive battleground. Each firm has the flexibility to compete aggressively for customers in its weak market (those located farther away) without having to cut price to customers in its strong market. Since firms disagree about which customers are their strong and weak market customers, however, all consumers are at least one firm's weak market. In this way, the ability to discriminate intensifies competition for *all* customers. All customers benefit as a result.

Because CSPD makes all firms worse off, one might think that firms would avoid price discrimination and increase their profits. However, the analysis above implies that each firm has a unilateral incentive to price discriminate whether or not its rivals price discriminate. If its rivals do not discriminate, a firm will discriminate in order to capture its rivals' customers and to raise its prices to its strong market customers. If rivals do discriminate, a firm will discriminate to attempt to retain customers that prefer its product. The firms are stuck in a prisoners' dilemma: they would all benefit if they could agree not to engage in price discrimination, but each has a unilateral incentive to break the agreement, whether or not the others break it. Corts explains the phenomena succinctly:

> While a monopolist is always better off discriminating, imperfectly competitive firms may find the uniform-price equilibrium more profitable than the discriminatory equilibrium. However, in a game in which decisions about whether to discriminate and what prices to charge are made simultaneously, price discrimination is a dominant strategy: given the other firm's strategy, each firm is better off unconstrained in its price choice. While this discrimination is unilaterally profit improving, in equilibrium it leads to lower profits for both firms; in this sense, the firms find themselves in a prisoner's dilemma.[29]

---

[29] Corts, *supra* note 2, at 318. *See also* Mark Armstrong & John Vickers, *Competitive Price Discrimination*, 32 RAND J. Econ. 579, 584 (2001) (noting "[t]he basic reason why [price discrimination based on spatial preferences] intensifies competition across the board is that it makes it cheaper for a firm to target its rival's customers without damaging the profits it can extract from its own customer base: when all firms target each others' customers, though, all prices come down.").

Thus, absent coordination, the firms in this example will price discriminate.[30]

The result that non-systematic price discrimination will undermine cartel stability by allowing its members to engage in secret price cuts is well-known.[31] The analysis here points to a result less appreciated in the antitrust community: systematic price discrimination can unambiguously improve consumer welfare even in an environment in which firms could not coordinate their behavior absent price discrimination.

## C. Price Discrimination in Other Environments

It would be misleading to leave the impression that price discrimination always or even typically intensifies competition. The spatial example establishes our main points: the practice of price discrimination implies neither that a market is not performing "competitively" nor that it would perform more "competitively" without price discrimination. However, the effects of price discrimination on competition are significantly more complicated than suggested by this simple spatial example. Price discrimination does not always intensify competition.

Two properties of the spatial example examined above are critical for the result that price discrimination intensifies competition. Both involve the distribution of discriminatory prices each firm would like to charge to various customers if it were price discriminating while all other firms continued to change a uniform price. First, the customers in the example to whom each firm would like to raise prices when it begins to price discriminate are customers to whom a rival firm would like to reduce price. In other words, the price changes that different firms would prefer to make to customers (each assuming its rivals are not changing prices) are negatively correlated.[32] Furthermore, the preferred price changes of firms are perfectly negatively correlated in the example: the customers to whom Firm 1 would prefer to lower price most (those closest to Firms 2 or 3) are the customers to whom Firms 2 and 3 would prefer to raise price the most. Second, the distribution of preferred price changes for

---

[30] Corts, *supra* note 2, shows that where there is a sufficient quality gap between high and low quality products, the low quality firm may be able to offer only a uniform price unless the high quality firm decides to offer different prices to "choosy" and non-choosy customers. When these conditions obtain, the high quality (or branded) firm may be able credibly to commit to offering only a uniform price. Corts hypothesizes that policies such as "no-haggle prices" offered by some car dealers, or "every-day-low-prices" offered by some retailers are examples of firms trying to signal a commitment to uniform prices.

[31] *See, e.g.,* RICHARD A. POSNER, ECONOMIC ANALYSIS OF THE LAW 291–92 (6th ed. 2003); Fiona Scott Morton, *The Strategic Response by Pharmaceutical Firms to the Medicaid Most-Favored-Customer Rules*, 28 RAND J. ECON. 269 (1997).

[32] This condition is best-response asymmetry, discussed *supra* Part I.

each firm in the example is not skewed: each firm would want to raise and lower price to equal numbers of customers.

In this environment, price discrimination intensifies competition. Unilateral price discrimination allows each firm to compete for its own weak market customers without having to reduce price to its own strong market customers; in doing so it lowers price to its rivals' strong market customers. Because each competing firm pursues this strategy and each must react to the lower prices offered by rivals to its own strong market customers, the resulting equilibrium prices are lower than they would be if firms could not price discriminate.

Changing either (or both) of these properties of the triangular city model can make the effects of price discrimination less clear-cut. For instance, suppose that best-response asymmetry still holds, but that the distribution of consumers is skewed so that many more consumers reside near the center of each route than near each firm. Unlike the case of uniformly distributed consumers, here consumers that place relatively less value on each firm's output weigh more heavily in each firm's best response function. If the firms cannot price discriminate, each charges a fairly low uniform price because it would not be profitable to lose the many sales they make to the low-value customers. As shown by Corts, if each firm's weak market is sufficiently important in its determination of profit-maximizing prices, price discrimination based on location can lead to higher prices for both strong- and weak-market customers.[33]

Alternatively, suppose that firms' weak and strong markets were positively rather than negatively correlated.[34] In this case, each firm wants to set higher discriminatory prices to the same group of consumers. For example, individuals with high incomes might be willing to pay more for a cruise vacation from any cruise line, while those with lower incomes are not willing to pay as much for any cruise. When firms agree on which markets are weak and which are strong, the effects of price discrimination are harder to determine. Because firms agree on the customers to whom they raise and lower price, competitive reactions to rivals may reinforce the initial responses of higher and lower prices. The net overall effect of price discrimination on welfare is determined by the degree to which prices increase for strong-market consumers and fall for weak-market consumers, which in turn depends on the curvature, the own-price elasticity, and the cross-price elasticity of demand.

––––––––––––––––

[33] *See* Corts, *supra* note 2.

[34] This condition is known as best-response symmetry. *See supra* text accompanying note 2.

## III. THE COMPETITIVE EFFECTS OF MERGERS

The application of our model to analysis in merger investigations is new: the economics literature has only recently begun to explore how price discrimination influences the competitive effects of a merger.[35] We analyze the example of a three-to-two merger between symmetric firms, a transaction that normally would be condemned unless there were substantial efficiencies or no customer complaints. Exploring the role of price discrimination in merger analysis, we examine the winners, losers, and welfare effects of mergers under price discrimination and compare these with merger effects absent price discrimination. Our example shows that the competitive effects of a merger, even when the change in concentration is substantial, may be much smaller when firms price discriminate than when they charge uniform prices.

### A. MERGER WITH UNIFORM PRICING

A merger between two firms eliminates their competition for customers that view those firms as their first and second choices. Returning to the example of a triangular city, a merger of Firms 1 and 2 eliminates their competition for all customers located on Route 12 and gives the merged firm a unilateral incentive to raise prices at both locations 1 and 2. Moreover, the unilateral increase in prices charged at locations 1 and 2 shifts out the demand facing Firm 3, because each customer on Routes 13 or 23 views one of the merging firms' products as its next best substitute. This gives Firm 3 an incentive to increase its uniform price as well.

The details involved in determining the post-merger uniform prices are presented in the Appendix. Here we simply report the post-merger prices of products 1, 2, and 3:

$$P_1^{Uniform,Post} = c + 10t$$
$$P_2^{Uniform,Post} = c + 10t \tag{8}$$
$$P_3^{Uniform,Post} = c + 8t.$$

Recall that the premerger uniform price from equation (2) was $c + 6t$. The merger increases the prices of the merging firms by \$$4t$ and the

---

[35] *See* Richard S. Higgins et al., *Spatial Competition and Merger*, 4 TOPICS IN ECONOMIC ANALYSIS & POLICY (No. 1), Article 3 (2004), *at* http://www.bepress.com/bejeap/topics/vol4/iss1/art3. Although the implications for merger analysis have not received systematic attention in the literature, the idea that price discrimination alters the analysis has been recognized for a long time. One of the authors recalls a merger between two proximate timber mills in the 1980s. A key fact was the ability of a third, more distant mill to bid aggressively for tracts located farther away from its own mills. This is analogous to the ability of a firm to reduce price to more distant customers. Had the rival mill been required to bid the same price for those distant tracts as for nearby tracts, competition would have been more localized and the merger would have been much more anticompetitive.

price of the rival by $2t$. The merger increases the prices of the merging firms more than the prices of its rivals—the typical unilateral effect of mergers in differentiated products environments.

Since the merging firms' prices rise by more than the price of the non-merging competitor, more customers buy from the competitor after the merger than before. Firm 3 sells to customers in regions D1, D2, E1, and E2 after the merger, whereas it sold only to customer in regions E1 and E2 prior to the merger. Other things equal, however, customers in regions D1 and D2 would prefer to buy from the merged firm because travel costs are lower than purchasing from Firm 3. Thus, the merger not only results in higher prices, it also creates another inefficiency: total costs of production plus travel would be lower if customers in regions D1 and D2 purchased from the merged firm.[36]

## B. Merger with Price Discrimination

Next, consider the effects on prices when Firms 1 and 2 merge and all firms can price discriminate by location. Before the merger, pricing to customers on Routes 13 and 23 was determined by competition between Firm 3 and Firm 1 (on Route 13) or between Firm 3 and Firm 2 (on Route 23)—not by competition between Firms 1 and 2. Each of these customers bought from its preferred (least-cost) supplier, paying a full price equal to the marginal cost (plus travel costs) of its second most-preferred competitor. A merger of Firms 1 and 2 has no effect on these "auctions" for the customers on Routes 13 and 23. To sell to customers on these routes, the merged firm still must meet and beat the best price Firm 3 can offer, which has not changed. Nor does the merger affect how low the merged firm is willing to bid to win customers on these routes from Firm 3. Therefore, customers located between the merging firms and Firm 3 will pay the same prices and purchase from the same locations after the merger as they did premerger.

In this example, price discrimination means that a three-to-two merger does not affect two-thirds of the customers. Moreover, competition with price discrimination results in customers continuing to purchase their closest alternative after the merger. Therefore, post-merger welfare is higher for the customers on Route 13 and 23 when the firms price discriminate than when they must charge uniform prices to all consumers.

Customers located between the merging firms' stores are less fortunate. Pricing on Route 12 before the merger did depend on an "auction"

---

[36] The product space interpretation of this result is that customers in regions D1 and D2 do not purchase their most-preferred brand.

between Firms 1 and 2. Because the merger eliminates competition between Firms 1 and 2, Firm 3 becomes the next closest competitor that will put in the second best "bid" for customers located on Route 12. Firm 3, however, is located farther away from customers on Route 12 than either Firm 1 or Firm 2, so it is less well placed to compete for sales to these customers. The price paid by these customers will rise by the difference between the cost of traveling to Firm 3 and the cost of traveling to the more distant outlet of the merged firm.

### C. Summary of Merger Effects

Table 2 summarizes the price effects for customers of a three-to-two merger in the triangular city example with and without price discrimination. Table 3 presents the effects for the particular case in which firms have a marginal cost of $2 and the travel cost per mile is $0.10.

The effect of the merger on consumers depends on their locations. As noted earlier, customers on Routes 13 and 23 are entirely insulated from the effects of the merger if firms price discriminate. They pay the same full price before and after the merger, because with price discrimination the merger does not change the nature of the auction for customers located on these routes. Customers on Route 12 are harmed by the merger, with or without price discrimination, because they lose the

**Table 2**
**Pre- and Post-Merger Full Prices With and Without Price Discrimination**

| Customer Location | Uniform Pricing | | Price Discrimination | |
|---|---|---|---|---|
| | Premerger Full Price | Post-Merger Full Price | Premerger Full Price | Post-Merger Full Price |
| *Rt. 12* | | | | |
| A1 | $c+6t+dt$ | $c+10t+dt$ | $c+6t-dt$ | $c+6t+dt$ |
| A2 | $c+6t+dt$ | $c+10t+dt$ | $c+6t-dt$ | $c+6t+dt$ |
| B1 | $c+6t+dt$ | $c+10t+dt$ | $c+6t-dt$ | $c+6t+dt$ |
| B2 | $c+6t+dt$ | $c+10t+dt$ | $c+6t-dt$ | $c+6t+dt$ |
| *Rts. 13 & 23* | | | | |
| C1 | $c+6t+dt$ | $c+10t+dt$ | $c+6t-dt$ | $c+6t-dt$ |
| C2 | $c+6t+dt$ | $c+10t+dt$ | $c+6t-dt$ | $c+6t-dt$ |
| D1 | $c+6t+dt$ | $c+8t+(6-d)t$ | $c+6t-dt$ | $c+6t-dt$ |
| D2 | $c+6t+dt$ | $c+8t+(6-d)t$ | $c+6t-dt$ | $c+6t-dt$ |
| E1 | $c+6t+dt$ | $c+8t+dt$ | $c+6t-dt$ | $c+6t-dt$ |
| E2 | $c+6t+dt$ | $c+8t+dt$ | $c+6t-dt$ | $c+6t-dt$ |

(Note: $d$ =Distance from customer to the nearest outlet.)

**Table 3**
**Pre- and Post-Merger Full Prices With and Without Price Discrimination**
$c = \$2$ and $t = \$0.10$[37]

| Customer Location | Uniform Pricing | | | | Price Discrimination | | | |
|---|---|---|---|---|---|---|---|---|
| | Pre-Merger Full Price | Post-Merger Full Price | Change in Full Price | % Change in Full Price | Pre-Merger Full Price | Post-Merger Full Price | Change in Full Price | % Change in Full Price |
| *Rt. 12* | | | | | | | | |
| A1 | $2.70 | $3.10 | $0.40 | 15% | $2.50 | $2.70 | $0.20 | 8% |
| A2 | $2.70 | $3.10 | $0.40 | 15% | $2.50 | $2.70 | $0.20 | 8% |
| B1 | $2.85 | $3.25 | $0.40 | 14% | $2.35 | $2.85 | $0.50 | 21% |
| B2 | $2.85 | $3.25 | $0.40 | 14% | $2.35 | $2.85 | $0.50 | 21% |
| *Rts. 13 & 23* | | | | | | | | |
| C1 | $2.70 | $3.10 | $0.40 | 15% | $2.50 | $2.50 | $0.00 | 0% |
| C2 | $2.70 | $3.10 | $0.40 | 15% | $2.50 | $2.50 | $0.00 | 0% |
| D1 | $2.85 | $3.15 | $0.30 | 11% | $2.35 | $2.35 | $0.00 | 0% |
| D2 | $2.85 | $3.15 | $0.30 | 11% | $2.35 | $2.35 | $0.00 | 0% |
| E1 | $2.75 | $2.95 | $0.20 | 7% | $2.45 | $2.45 | $0.00 | 0% |
| E2 | $2.75 | $2.95 | $0.20 | 7% | $2.45 | $2.45 | $0.00 | 0% |
| **Average Change:** | | | $.32 | 12% | | | $.10 | 4% |

benefits of direct competition between Firms 1 and 2.[38] Customers in region A1 and A2 of Route 12 are harmed more by the merger when firms set uniform prices than when they price discriminate. Firm 3 is close enough to these customers that its aggressive bidding when firms price discriminate significantly constrains the merged firm's ability to raise price.

Customers in regions B1 and B2 of Route 12, on the other hand, are harmed more by the merger when firms price discriminate than when they set uniform prices. Firm 3 is too far away from these customers to provide much constraint on the merged firm when firms price discriminate. Firm 3 is a stronger constraint when firms set uniform prices

---

[37] Full prices are evaluated for customers located in the center of each region.

[38] Under uniform pricing, the merger's effect on Route 12 customers is not uniformly greater than on Route 13 and 23 customers. Table 3 shows that the absolute price change for C1 and C2 customers on Routes 13 and 23 is the same as for customers on Routes 12, and the percentage price increase for C1 and C2 customers is slightly greater (in percentage terms) than for B1 and B2 customers and same as for A1 and A2 customers. The price changes with uniform pricing for the remaining customers on Routes 13 and 23—those in D1, D2, E1, and E2—are smaller than the increases experienced by customers on Route 12.

because then the merged firms' desire to compete for customers closer to Firm 3 moderates the uniform price the merged firm charges customers more distant from Firm 3.

The average price increases across all customers, in absolute and percentage terms, with and without price discrimination, are presented at the bottom of Table 3. In this example, the average price effect of the merger is much smaller when firms can price discriminate than when they must set uniform prices. The merger causes the average full price to rise by 12 percent with uniform pricing but by only 4 percent with price discrimination. In this example, there is less basis for antitrust concern with the merger when firms price discriminate than when they cannot do so.[39]

### D. Merger and Price Discrimination in Other Environments

As highlighted in Part II.B, the market environment affects whether price discrimination intensifies competition. The impact of price discrimination on merger effects is sensitive to the particular market environment as well. To illustrate this point, we analyze the effects of mergers in a richer, more realistic, and complex setting than the triangular city—one in which consumer preferences depend on price, the distance that consumers have to travel, and the distribution of idiosyncratic preferences. To make this concrete, imagine that the firms are French, Chinese, and Italian restaurants. The utility that a particular consumer ($j$) derives from eating at a particular restaurant ($i$) depends on the price at restaurant $i$ ($p_i$), the distance the consumer $j$ has to travel to get to restaurant $i$ ($d_{ij}$) and the consumer's idiosyncratic preferences for types of cuisine ($e_{ij}$):

$$U_{ij} = \beta p_i - \delta d + e_{ij}. \tag{9}$$

If we assume a probability distribution for customers' idiosyncratic preferences, like the extreme value distribution, then we can compute the probability that a consumer located at point $j$ will select one of the restaurants, e.g., Restaurant 1, as a function of the relative prices and distances to all three restaurants.

$$q_{1j} = \frac{\exp(U_{1j})}{\exp(U_{1j}) + \exp(U_{2j}) + \exp(U_{3j}) + \exp(U_0)}. \tag{10}$$

Equation (10) is simply a demand curve relating the expected number of consumers who reside at point $j$ who choose Restaurant 1 to the

---

[39] It can be shown that in this example the merger raises the average full price by more under uniform pricing than it does under price discrimination for all possible values of the unit cost $c$ and the travel cost $t$.

relative prices at and distances to each of the other restaurants.[40] One can think of the probability that a consumer at a location will choose a restaurant as giving the proportion of customers at that location who will choose the restaurant. We can derive similar expressions for the probability that a consumer located at point $j$ would choose Restaurants 2 or 3. The expected number of consumers who choose each restaurant is simply a function of the probability of going to that restaurant multiplied by the number of consumers at each point.

The term $U_0$ in Equation (10) refers to the no-purchase decision; consumers may choose not to go to any of these restaurants and instead to spend the money saved on what is called the "outside good." The attractiveness of the outside alternative determines the aggregate elasticity of demand for all three restaurants—the more attractive the outside alternative, the more elastic is aggregate demand. More elastic aggregate demand leads to smaller merger effects because the outside good constrains the ability of the merged firm to raise price.

In the marketing literature, this is known as a "gravity choice" model because, like the force of gravity, the probability of choosing a restaurant increases as distance to the restaurant decreases. Typically, gravity choice models are applied to situations where consumers are distributed over an area. For example, Froeb, Tschantz, and Crooke examine the demand for parking lots as a function of the price charged at each lot and the desired destinations of commuters.[41] Alternatively, geographic location can be interpreted as a metaphor for brand "location," as is done in the field of marketing with brand "maps" that use product characteristics rather than location to identify gaps in product offerings relative to the distribution of consumer tastes.[42] In this instance, distance is a metaphor for how "far" the characteristics of a product are from an individual's preferences. The closer a product is to a customer's preferred location, the higher the probability that the consumer will choose the brand.

Unlike the triangular city model above, however, equilibrium in these models must be computed numerically. This means that it is not possible to generalize these results to other environments, with different distributions of customer tastes or different firm characteristics without specifying a model, fitting it to the salient features of the industry, and

_____

[40] Formally, consumer preferences are represented by a mixed logit distribution, where the mixing occurs over the geographic distribution of consumers.

[41] Luke Froeb, Steven Tschantz & Philip Crooke, *Bertrand Competition with Capacity Constraints: Mergers Among Parking Lots*, 113 J. ECONOMETRICS 49 (2003).

[42] PHILLIP KOTLER, MARKETING MANAGEMENT (11th ed. 2002).

computing equilibria.[43] We suspect that the findings about mergers and price discrimination summarized by the computational experiments below would generalize to other environments, but this is only a conjecture. The flexibility of this model makes many more results possible than in the simple deterministic triangle model, but the price of the added flexibility is less generality.

The specific distributional assumptions about tastes lead to the functional form of equation (10). We report results for computational experiments in which customers are uniformly distributed over a 10×10 square, with firms located at points (1,2), (2,1), and (7,7), as illustrated in Figure 2.

To understand how price discrimination affects competition in these particular conditions, consider the demand facing an individual restaurant. Those customers located near the restaurant have relatively inelastic
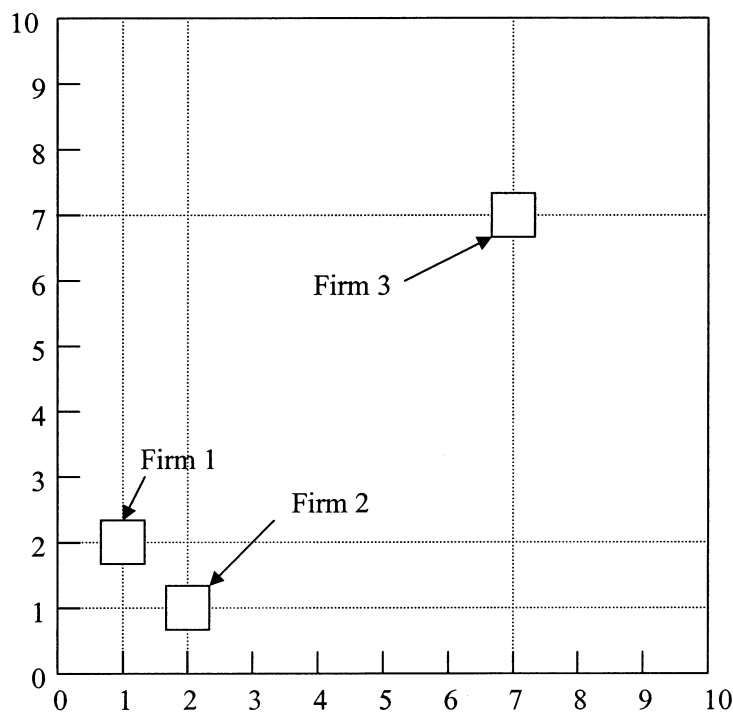
**Figure 2. Spatial Competition in a Square City**

[43] *See* Gregory J. Werden, Luke M. Froeb & David T. Scheffman, *A* Daubert *Discipline for Merger Simulation*, ANTITRUST, Summer 2004, at 89.

demands while those located farther away have more elastic demands. Any price discrimination scheme would involve higher prices for those located next to the restaurant, and lower prices for those located farther away.[44] A restaurant in our example might implement such a scheme by mailing different discount coupons to customers outside its own immediate neighborhood. Just as in our triangle model, if each restaurant followed such a scheme, price discrimination would make all consumers better off by increasing the intensity of competition relative to uniform pricing. Heuristically, price discrimination in this setting increases the market "reach" of each firm by allowing it to compete for customers located near its competitors. When all firms do this, all consumers benefit. This is an example of CSPD in a more complex and realistic environment than that of the triangle city model.

Now consider the effects of mergers with and without price discrimination. Because Firms 1 and 2 are located relatively close to each other in the southwest part of the city, they are close substitutes for one another, while Firm 3, located further away, is a relatively poor substitute. If Firms 1 and 2 merge, Firm 3 will be unable to exert much competitive pressure on the merged entity if it sets uniform prices because it is located so far away. If Firm 3 price discriminates, however, it can increase its market reach by offering discounts to consumers located near the merging firms, and so can more effectively constrain price increases by a merged Firm 1 and 2.

Alternatively, consider a merger between Firms 1 and 3. These firms are poor substitutes because they are so far away from each other. Relatively little competition is lost from their merger if the firms set uniform prices because most of the competition is between Firms 1 and 2, and that is unaffected by merger. As above, however, Firm 3 increases its market "reach" if it price discriminates by offering discounts to consumers located near its merging partner. Price discrimination makes Firm 3 a more potent competitor of Firm 1 premerger, but that also means that a merger of Firms 1 and 3 eliminates more competition when these firms price discriminate than when they set uniform prices. Thus, price discrimination increases the effect on prices of a merger of Firms 1 and 3.

We used numerical techniques to determine equilibrium prices with each pricing regime both for a merger between the two firms closest to each other, Firms 1 and 2, and for a merger between two distant firms, Firms 1 and 3. The qualitative implications of this analysis are presented

---

[44] Implicitly, we are assuming that the restaurants can observe and price discriminate based on location, but not based on consumers' individual preferences for cuisine.

in Table 4, which rank orders the average percentage increase in price due to the merger in these four cases.

Not surprisingly, a merger between "nearby" Firms 1 and 2 results in a larger average percentage increase in price than a merger between more distant Firms 1 and 3, regardless of whether firms can price discriminate. The more interesting result is that price discrimination does not necessarily attenuate merger effects, as it did in the triangular city model examined earlier. The price effects of a merger of more distant competitors are bigger under price discrimination than under uniform pricing. The ability to price discriminate intensifies premerger competition between distant competitors more than it intensifies competition between nearby competitors. This valuable competition between relatively distant firms that price discriminate is lost when they merge. Under uniform pricing, in contrast, the premerger competition between distant competitors is more limited. Thus, the loss in competition from the merger is not as great.

When close competitors merge, however, the qualitative predictions of the square city model are the same as in the triangular city example above: consumers are harmed more by the merger when pricing is uniform than when firms price discriminate. The intuition is that price discrimination has a relatively small intensifying effect on competition among close competitors, because they are intensely competitive even

**Table 4**
**Merger Effects With and Without Price Discrimination**

| Characteristics of Merging Firms and Pricing Regime | Magnitude of Merger Effect |
|---|---|
| "Close" in product or geographic space and uniform pricing | 1. Biggest percentage price effect |
| "Close" in product or geographic space and discriminatory pricing | 2. Slightly smaller percentage price effect |
| "Distant" in product or geographic space and discriminatory pricing | 3. Small percentage price effect |
| "Distant" in product or geographic space and uniform pricing | 4. Smallest percentage price effect |

with uniform pricing. On the other hand, price discrimination does substantially intensify the competition between the merging firms and the distant competitor, competition that is relatively weak with uniform pricing. The result is that prices rise by more from a merger of nearby competitors under uniform pricing than under price discrimination.

The point of this example is not the specific outcome. Instead, it is intended to demonstrate that price discrimination often will affect the magnitude of the price effect of the merger, but that the nature of this impact will depend on the specifics of the competitive environment.[45]

## IV. EVIDENCE OF MARKET POWER

The potential of price discrimination for intensifying competition also is relevant for legal rules that infer market power from observations that firms price discriminate. The concept of market power is ubiquitous in antitrust analysis. In a Sherman Section 1 case analyzed under the rule of reason, a plaintiff has the burden of showing that the restraint complained of has a net detrimental effect on competition.[46] To meet this burden the plaintiff must show either "genuine adverse effects on competition" or, as a "surrogate" for adverse competitive effects, that the defendant possesses market power.[47] In Sherman Act Section 2 monopolization and attempt cases, a plaintiff must show that the defendant possesses, or has a dangerous probability of achieving, "monopoly power."[48] Market

---

[45] We want to stress the sensitivity of these results to the exact assumptions of this specific case, something implicit in Stole's review of the theoretical literature, *supra* note1. In our specific case, we had to move beyond the simple Hotelling triangle model to show that discrimination can amplify merger effects by bringing the merged firms into closer competition with one another. This is not possible in a simple Hotelling model because moving firms closer together has two offsetting effects: moving firms closer together increases own-price and cross-price elasticity by the same factor. Ordinarily, to make a valid comparison we would want to calibrate the model to prices, shares, and own elasticities. Then moving firms closer together would mean giving them a larger cross-price elasticity for the same own-price elasticity. But with increased own-price and cross-price elasticity, an increase in price means more lost demand goes to the merging partner but also more demand is lost, so the merger effects do not necessarily become larger.

[46] *See* State Oil Co. v. Khan, 522 U.S. 3, 10 (1997) (under a rule of reason analysis "the finder of fact must decide whether the questioned practice imposes an unreasonable restraint on competition"); Polygram Holding, Inc., FTC Docket No. 9298, at 13–35 (June 28, 2003), *available at* http://www.ftc.gov/os/adjpro/d9298/030724commoppinionand finalorder.pdf (discussion of the legal analysis of horizontal restraints under Sherman Act § 1); Virgin Atl. Airways, Ltd. v. British Airways PLC, 252 F.3d 256, 264 (2d Cir. 2001).

[47] FTC v. Indiana Fed'n of Dentists, 476 U.S. 447, 460–61 (1986). *See also* Tops Mkt., Inc. v. Quality Mkts., Inc., 142 F.3d 90, 96 (2d Cir. 1998); Chicago Prof'l Sports Ltd. v. NBA, 95 F.3d 593, 600 (7th Cir. 1996).

[48] The Supreme Court stated in *Eastman Kodak Co. v. Image Technical Services., Inc.*, that monopoly power is "something greater than market power under Section 1." 504 U.S. 451, 481 (1992). *See also* Spectrum Sports, Inc. v. McQuillan, 506 U.S. 447, 459 (1993)

power is relevant in antitrust because proscribed conduct that leads to, or sustains, market power has the potential to harm consumers through higher prices, reduced output, less variety, or lower quality.[49] In the absence of market power, for example, certain unilateral or joint activities would have no potential to harm competition because the actors would be unable to affect the relevant market variables.

Courts most often turn to market share as indicia of market power,[50] but plaintiffs in antitrust cases sometimes are able to present evidence of price discrimination to prove the existence of market power.[51] In these cases, price discrimination can be the first link in a chain of implications designed ultimately to show adverse effects: price discrimination implies market power, which, in turn, implies that the conduct in question has the potential to harm competition.

## A. Price Discrimination as Proof of Market Power

The idea that price discrimination is evidence of monopoly power appears to have its genesis in early analysis of tying arrangements and, perhaps, can be traced to a 1957 article by Professor Ward Bowman.[52] Bowman pointed out that, when tying is employed as a method of price discrimination, "tying is used simply as a means of insuring the full monopoly return on the tying product, *where a monopoly already existed*."[53] A year later Professor Donald Turner, while disagreeing with Bowman's suggestion that antitrust should not be concerned with tying to effect

---

(attempt to monopolize requires inquiry into defendant's "economic power" in a relevant market). Carlton & Perloff argue that the economic distinction between monopoly and market power should be that although price is above marginal cost in either case, in cases of monopoly power, the rate of return exceeds the competitive one. *See* Dennis W. Carlton & Jeffrey M. Perloff, Modern Industrial Organization 93 (4th ed. 2005).

[49] *See* 11 Herbert Hovenkamp, Antitrust Law ¶¶ 1912d–e (1998) ("Any time a firm or group of firms with significant market power reduces its own output, one can infer that market-wide output is reduced as well. . . . The prohibited consequence of a horizontal restraint on trade is that it permits the defendants to reduce the output in the relevant market, which is a prerequisite to a supracompetitive price increase.").

[50] *See Kodak*, 504 U.S. at 464 ("The existence of such [market] power ordinarily is inferred from the seller's possession of a predominant share of the market.") (citing Jefferson Parish Hosp. Dist. No. 4 v. Hyde, 466 U.S. 2, 17 (1984)); United States v. Grinnell Corp., 384 U.S. 563, 571 (1966); Times-Picayune Publ'g Co. v. United States, 345 U.S. 594, 611–13 (1953)).

[51] *See* U.S. Dep't of Justice & Federal Trade Comm'n, Horizontal Merger Guidelines §§ 1.51, 2.211, 2.22 (1992, revised 1997) *available at* http://www.ftc.gov/bc/docs/horizmer.htm; U.S. Dep't of Justice & Federal Trade Comm'n, Antitrust Guidelines for Collaborations Among Competitors § 3.33 (2000), *available at* http://www.ftc.gov/os/2000/04/ftcdojguidelines.pdf.

[52] Ward S. Bowman, *Tying Arrangements and the Leverage Problem*, 67 Yale L.J. 19 (1957).

[53] *Id.* at 24 (emphasis added).

price discrimination, drew an even tighter connection between price discrimination and monopoly power:

> Professor Bowman . . . suggests that the tying seller may have a legitimate interest in measuring the intensity with which the tying product (such as a machine) is used by the lessee, and in charging each lessee in proportion to his use (*i.e.* discriminating in price). This interest exists even when the seller has a clear monopoly in the tying product; *in fact, the ability to maintain price discrimination presupposes some degree of monopoly power.*[54]

The notion that price discrimination evidences market power seems to have first appeared in Supreme Court jurisprudence some years later in *Fortner Enterprises., Inc. v. U.S. Steel Corp.* (*Fortner I*).[55] There, relying on evidence that the defendant offered "unique" credit terms, the Court reversed a finding that U.S. Steel did not possess sufficient power in the credit market to satisfy the "dominance" element of the per se tying test. Justice White in dissent elaborated on the possible anticompetitive effects of tying. Citing both Bowman and Turner, Justice White characterized a tying arrangement that is "used as a counting device to effect price discrimination" as a "distortion [that] depend[s] upon the existence of some market power in the tying product."[56]

The first explicit adoption of a rule allowing a plaintiff to show market power with evidence of price discrimination appears eight years later, in *Fortner II*.[57] There, the Supreme Court revisited the tying arrangement in *Fortner I*, this time holding that U.S. Steel lacked sufficient power in the credit market to effect a per se tie. Finding that Fortner was not required "to purchase varying quantities of the tied product [financing] over an extended period of time," the Court distinguished the arrangement before it from "price discrimination," which "would imply the existence of power that a free market would not tolerate."[58]

---

[54] Donald F. Turner, *The Validity of Tying Arrangements Under the Antitrust Laws*, 72 HARV. L REV. 50, 63 n.42 (1958) (emphasis added).

[55] 394 U.S. 495 (1969).

[56] *Id.* at 513–14

[57] U.S. Steel Corp. v. Fortner Enters., Inc., 429 U.S. 610 (1977). In the intervening years between *Fortner I* and *Fortner II,* the Ninth Circuit in *Siegel v. Chicken Delight, Inc.*, held that a fast-food franchisor could not justify requiring a franchisee to purchase supplies from the franchisor as a means for "measuring and collecting revenue." 448 F.2d 43, 50 (9th Cir. 1971). The court stated: "There is no authority for justifying a tying arrangement on this ground. Unquestionably, there exist feasible alternative methods of compensation for the franchise licenses, including royalties based on sales volume or fees computed per unit of time, which would neither involve tie-ins nor have undesirable anticompetitive consequences." *Id.*

[58] *Fortner II,* 429 U.S. at 617. *See also Jefferson Parish,* 466 U.S. at 37 n.4 (*Fortner II* stood for proposition "that price discrimination may indicate market power in the tying-product market").

The belief that price discrimination indicates market power appears to be widely held in antitrust jurisprudence since *Fortner II*.[59] The recent Seventh Circuit opinion in *In re Brand Name Prescription Drugs Antitrust Litigation* is representative: "The presence of price discrimination in the economic sense is evidence of the presence of monopoly power. [C]ompetition must be weak or absent, because it has failed to force prices down to cost."[60]

The reasoning in *Fortner II* and its progeny appears to follow from combining (1) the standard microeconomic result that perfectly competitive markets yield prices equal to marginal cost, with (2) the accepted legal definition of "market power" as "the ability to raise prices above those that would be charged in a competitive market."[61] According to

---

[59] Perhaps marking the first seepage of the *Fortner II* dictum into the lower courts, a 1977 Ninth Circuit decision involving grave-site owners' requirements that cemetery lot customers also purchase their markers and installation services cited *Fortner II* for the proposition that "the logic of some tie-in opinions leaves something to be desired [because t]hey have failed to recognize the importance of tie-ins as a means of price discrimination." Moore v. Jas. H. Matthews & Co., 550 F.2d 1207, 1213 (9th Cir. 1977). The court in *Moore* went on to conclude that "[o]nly when the tying arrangement permits price discrimination does our traditional concern with the seller's economic position in the tied product market become realistic." *Id. See also* United Farmers Agents Ass'n, Inc. v. Farmers Ins. Exch., 89 F.3d 233, 237 (5th Cir. 1996) (market power "highly unlikely in the absence of prohibitive information costs or the ability to price discriminate"); United States v. Eastman Kodak Co., 63 F.3d 95, 106 n.6 (2d Cir. 1995) (noting the "acceptance in the academic community" of the "theory that price discrimination is one of the indicia of market power"); United Air Lines, Inc. v. Civil Aeronautics Board, 766 F.2d 1107, 1117 (7th Cir. 1985) (price discrimination is "symptomatic of monopoly or market power"); Will v. Comprehensive Accounting Corp., 776 F.2d 665, 671 (7th Cir. 1985) (the practice of price discrimination is "impossible unless the seller has substantial market power."); USM Corp. v. SPS Tech., Inc., 694 F.2d 505, 511 (7th Cir. 1982) (price discrimination "presupposes market power"); *In re* Air Passenger Computer Reservation Sys. Antitrust Litig., 694 F. Supp. 1443, 1462 (C.D. Cal. 1988) ("The ability to engage in price discrimination is an indication that American has market power."); Martino v. McDonald's Sys., Inc., 625 F. Supp. 356, 361 (N.D. Ill. 1985) ("the absence of direct proof of price discrimination, requires a market share in the tying market of more than 30 percent"); United States v. Microsoft Corp, DOJ Proposed Findings of Fact, ¶ 38.3, *available at* http://www.usdoj.gov/atr/cases/f2600/ii-c.pdf ("Microsoft's sustained ability to price discriminate is probative of market power, and therefore consistent with monopoly power."). Professor Jonathan Baker recently has argued: "Price discrimination is properly understood as providing evidence of market power, as antitrust law has long recognized. After all, the practice of price discrimination shows that firms face a downward-sloping demand curve and could potentially raise price by reducing output." Jonathan B. Baker, *Competitive Price Discrimination: The Exercise of Market Power Without Anticompetitive Effect (Comment on Klein & Wiley)*, 70 ANTITRUST L.J. 643, 644–45 (2003). Baker, however, allows that a defendant "could break the link between market power and anticompetitive effect" by presenting evidence that entry is easy. *Id.* at 645.

[60] 123 F.3d 599, 603 (7th Cir. 1997).

[61] NCAA v. Board of Regents, 468 U.S. 85, 109 n.38 (1984). Similarly the FTC and DOJ define "market power" in the Horizontal Merger Guidelines as "the ability profitably to maintain prices above competitive levels for a significant period of time." Horizontal

this reasoning, price discrimination yields prices that are above marginal cost and therefore are higher than those that would occur in a perfectly competitive market. And, if one defines market power as the ability to charge a price above that found in a competitive market, by this reasoning the presence of price discrimination ipso facto is evidence of market power.

There are two problems with this logic. First, price discrimination is perfectly consistent with competition, just not with perfect competition.[62] Price discrimination implies that price is above marginal cost, but this observation has no bearing on a firm's potential to harm competition. A price above marginal cost, by itself, tells us only that firms' products are not perfect substitutes, which is almost always the case.[63] Thus, observing price discrimination cannot tell us whether competition is "weak or absent," but only that perfect competition has not obtained, which is hardly a sufficient basis for antitrust intervention.[64]

––––––––––––––

Merger Guidelines, *supra* note 51, § 0.1. *See also Kodak,* 504 U.S. at 464 ("Market power is the power 'to force a purchaser to do something that he would not do in a competitive market.'") (quoting Jefferson Parish Hosp. Dist. No. 4 v. Hyde, 466 U.S. 1, 14 (1984)) ("It has been described as 'the ability of a single seller to raise price and restrict output.'") (quoting *Fortner II,* 394 U.S. at 503). *Kodak,* 504 U.S. at 464.

[62] *See, e.g.,* 2A AREEDA & HOVENKAMP, *supra* note 15, ¶ 517 ("price discrimination seldom shows the amount of power, and many instances of price discrimination are quite consistent with robust but imperfect competition"); *see also* James D. Dana, Jr., *Equilibrium Price Dispersion Under Demand Uncertainty: The Roles of Costly Capacity and Market Structure,* 30 RAND J. ECON. 632 (1999) (generalizing the definition of competitive equilibrium to allow for price dispersion and showing that such an equilibrium can arise in industries with large fixed costs and capacity constraints).

[63] *See, e.g.,* Klein & Wiley, *supra* note 1, at 625 ("The presence of price discrimination in a differentiated products context, therefore, would not imply the existence of market power."); Baumol & Swanson, *supra* note 1, at 663 (in the context of high-fixed cost/declining-marginal cost industries defining market power for antitrust purposes as a deviation from marginal cost-pricing will "generat[e] tests that are invalid in many instances"); AREEDA & HOVENKAMP, *supra* note 15, ¶ 517c4 ("Significant product differentiation generally undermines any useful correlation between price discrimination and the kind of market power that is necessary for antitrust analysis.").

[64] Indeed, in a revision of an early statement, Judge Posner has recognized that perfect competition is not needed for a fiercely competitive market to exist:

> Persistent price discrimination can be evidence of monopoly because it is inconsistent with a competitive market; it implies that some consumers are paying more than the cost of serving them, a situation that would disappear with competition, at least *perfect competition.* (*The qualifications "can be" and "at least perfect competition" are important* . . . .)

RICHARD A. POSNER, ANTITRUST LAW 80–81 (2d ed. 2001) (emphasis added). This statement appears to be a revision of a similar one in an earlier treatise that did not include the "important" qualifying language of the last sentence:

> Persistent discrimination is very good evidence of monopoly because it is inconsistent with a competitive market; it implies that some consumers are paying more than the cost of serving them, a situation that would disappear with *competition.*

Second, focusing on a firm's own-price elasticity to show the potential to harm competition—which is implied when courts look to price discrimination as evidence of market power—departs from a proper reading of courts' interpretations of market power. As pointed out in previous work, when courts speak of market power, they typically mean the ability to affect market-wide price, not merely one's own price.[65] Indeed, such an interpretation seems dictated by *Indiana Federation of Dentists*, where the Supreme Court held that evidence of market power is but "a surrogate" for "genuine adverse effects on *competition*."[66] Evidence of price discrimination—which shows only that a firm is able to set its own price above marginal costs—cannot demonstrate that a firm has the ability to affect market-wide prices and output.[67]

If price discrimination provides little information about the state of competition in the relevant market, allowing plaintiffs to use price discrimination to construct an evidentiary chain to show that the conduct in question is likely to harm competition almost certainly means that too many firms have to defend antitrust cases. Importantly, spatial price discrimination itself can produce more intense competition and, concomitantly, lower prices than uniform pricing. This is likely to mean that the false-positive rate and costs attendant to this evidentiary chain are higher than previously recognized.

## B. Error Costs

Due to an imperfect ability to foresee every circumstance, most legal rules will yield an incorrect outcome when applied to some sets of facts. That is, they sometimes will generate false negatives and fail to detect the guilty (Type-II error), or false positives and punish the innocent

---

RICHARD POSNER, ANTITRUST LAW: AN ECONOMIC PERSPECTIVE 63 (1976) (emphasis added). Klein and Wiley show that other scholars similarly have revised their thinking. Klein & Wiley, *supra* note 1, at 625–26.

[65] For a very thorough discussion of this point, see Klein & Wiley, *supra* note 1, at 629–33; Benjamin Klein, *Market Power in Antitrust: Economic Analysis After* Kodak, 3 SUP. CT. ECON. REV. 43, 71–85 (1993). The authors argue that because market power in antitrust means the ability to affect market-wide prices, observing price above marginal cost says nothing about market power. In this way, the issue is not at what levels do price-cost mark-ups become a worry for antitrust, but rather that the inquiry into own-price elasticity is irrelevant in the first place.

[66] 476 U.S. at 460–61 (emphasis added).

[67] Judge Posner has written that though price discrimination may be evidence of market power, "market power is found in many highly competitive markets." *In re* Brand Name Prescription Drugs Antitrust Litig., 186 F.3d 781, 786–87 (7th Cir. 1999). This statement, however, highlights the tension between the economic definition of market power—the ability to price above marginal cost—and this definition's usefulness in antitrust analysis. Because antitrust is designed to protect competition, there is doubt about the relevance for any antitrust inquiry of a market power that coexists with intense competition.

(Type-I error).[68] It follows, then, that most legal rules will deter some from engaging in perfectly legal behavior if the behavior increases the risk of erroneously being held liable.

The level of unwanted deterrence is a positive function of the Type-I error rate and the severity and likelihood of punishment. The social costs of Type-I errors in legal rules in turn increase with (1) the level of unwanted deterrence, and (2) how socially beneficial this deterred behavior is. Where it is difficult to fashion a test subtle enough to differentiate legal from illegal behavior, and the legal behavior is so beneficial that we do not want to risk deterring it, a cost-benefit standard would suggest that courts should err on the side of caution by condemning behavior only in the narrowest of circumstance.

The Supreme Court has shown an awareness of the cost of Type-I errors in its narrowing of the application of per se rules.[69] Under a per se rule, courts condemn conduct without inquiring into market conditions, reflecting a "presumption of unreasonableness based on business certainty and litigation efficiency."[70] Over the last twenty-five years, the Court has narrowed the class of conduct it condemns per se, concluding that per se treatment is inappropriate for vertical nonprice restraints,[71] some horizontal collaborations,[72] and, most recently, maximum resale price maintenance.[73] In addition, tying, which ostensibly is still governed by a per se rule, now generally is analyzed under a quasi-rule of reason inquiry.[74] This evolution represents recognition that falsely

---

[68] In statistical parlance, a Type-I error occurs when the null hypothesis is incorrectly rejected, and a Type-II error occurs when there is a failure to reject the null when the null is, in fact, false. In a legal setting, if the null hypothesis is that the conduct in question is legal, a legal rule tests the null by applying the surrounding facts to the law. In this context, a Type-I error is falsely rejecting the null of legality (i.e., wrongly finding a defendant liable), and a Type-II error occurs when the null of legality is not rejected even though the defendant's conduct actually violated the law. *See* MICHAEL O. FINKELSTEIN & BRUCE LEVIN, STATISTICS FOR LAWYERS 124–26 (1990); *see also* RICHARD A. POSNER, ECONOMIC ANALYSIS OF THE LAW 618 (6th ed. 2003).

[69] *See* Fred S. McChesney, *Talking 'Bout My Antitrust Generation: Competition for and in the Field of Competition Law*, 52 EMORY L.J. 1401, 1411–13 (2003).

[70] Atl. Richfield Co. v. USA Petroleum Co., 495 U.S. 328, 342 (1990). *See also Jefferson Parish*, 466 U.S. at 15–16 n.25 ("The rationale for per se rules is in part to avoid a burdensome inquiry into actual market conditions in situations where the likelihood of anticompetitive conduct is so great as to render unjustified the costs of determining whether the particular case at bar involves anticompetitive conduct.").

[71] *See* Continental T.V., Inc. v. GTE Sylvania Inc., 433 U.S. 36 (1977).

[72] *See* Broadcast Music Inc. v. CBS, Inc., 441 U.S. 1 (1979).

[73] *See* State Oil Co. v. Khan, 522 U.S. 3 (1997).

[74] *See, e.g.*, United States v. Microsoft Corp., 253 F.3d 34, 84–95 (D.C. Cir. 2001). In *Jefferson Parish* Justice O'Connor urged the Court to adopt a rule of reason treatment for tying. 466 U.S. at 34–35 (O'Connor, J., concurring).

condemning truly competitive conduct is likely to exact more costs on society than failing to hold a firm liable for truly anticompetitive conduct. The reason for this is that stare decisis insulates the deterrent effect of a Type-I error, while the market may self-correct Type-II errors.[75]

The Supreme Court's Section 2 jurisprudence also demonstrates a concern with Type-I error. In *Spectrum Sports*, for example, the Supreme Court pointed out that it is much harder to distinguish competitive from anticompetitive unilateral conduct than it is to identify harmful concerted activity:

> [T]his Court and other courts have been careful to avoid constructions of § 2 which might chill competition, rather than foster it. It is sometimes difficult to distinguish robust competition from conduct with long-term anticompetitive effects; moreover, single-firm activity is unlike concerted activity covered by § 1, which inherently is fraught with anti-competitive risk.[76]

This concern has been most pronounced in predatory pricing jurisprudence, where the conduct being examined—lowering prices—is almost invariably associated with procompetitive conduct. In *Matsushita Electric Industries Co. v. Zenith Radio*, confronted with an alleged predatory pricing conspiracy, the Court observed that "cutting prices in order to increase business often is the very essence of competition," and stated in now-famous language that "mistaken inferences" in cases involving generally procompetitive conduct, "are especially costly because they chill the very conduct the antitrust laws are designed to protect."[77] In its most recent foray into predatory pricing, *Brooke Group Ltd. v. Brown & Williamson Tobacco Co.*, the Court again expressed concern with the likely high cost from Type-I error of legal rules that attempt to distinguish predatory pricing from procompetitive price cutting: "[T]he costs of an erroneous

---

[75] As Frank H. Easterbrook observes:

> If the court errs by condemning a beneficial practice, the benefits may be lost for good. Any other firm that uses the condemned practice faces sanctions in the name of stare decisis, no matter the benefits. If the court errs by permitting a deleterious practice, though, the welfare loss decreases over time. Monopoly is self-destructive. Monopoly prices eventually attract entry.

*The Limits of Antitrust*, 63 TEX. L. REV. 1, 2 (1984). *See also* McChesney, *supra* note 69, at 1412 ("The cost of Type II errors . . . will be low, as long as barriers to entering markets plagued by suspected anticompetition are also low. As prices rise because of anticompetitive contracts or practices, new entrants emerge to alleviate or even eradicate the problem."). Of course, if entry barriers are low, perhaps there was no Type-II error in the first place. That is, if anticompetitive behavior is self-correcting, it correctly is not condemned under the antitrust laws.

[76] Spectrum Sports, Inc. v. McQuillan, 506 U.S. 447, 458–59 (1993) (internal quotation omitted).

[77] 475 U.S. 574, 594 (1986).

finding of liability are high. The mechanism by which a firm engages in predatory pricing—lowering prices—is the same mechanism by which a firm stimulates competition."[78]

Very recently, in *Verizon Communications Inc. v. Law Offices of Curtis V. Trinko*, the Court addressed the issue of Type-I errors in Sherman Section 2 in the context of unilateral refusals to deal.[79] The issue in *Trinko* was whether a plaintiff can bring an antitrust suit for an alleged violation of provisions of the 1996 Telecom Act that require incumbent local exchange carriers to provide competitors access to their network. In rejecting such a cause of action under Sherman Section 2, the Court echoed its earlier statement in *Matsushita*, that "[m]istaken inferences and the resulting false condemnations 'are especially costly, because they chill the very conduct the antitrust laws are designed to protect.'"[80]

A legal rule that price discrimination implies market power also is subject to Type-I error. Firms in many competitive market settings engage in price discrimination to increase profits, and, as we have shown, CSPD actually enhances competition. Such instances of price discrimination are unlikely to portend anticompetitive effects from challenged conduct, suggesting that the Type-I error rate of a price discrimination screen to detect market power is likely to be large. It is true that market power is but one element of a Section 1 or 2 case and that, perhaps, a defendant can rebut an inference of market power by "break[ing] the link between market power and anticompetitive effect, upon a demonstration that entry is easy."[81] Nevertheless, this rule probably would allow a plaintiff to get past dismissal upon a showing of price discrimination, forcing discovery and summary judgment briefing, which present a significant cost even if the defendant ultimately prevails. Further, because outcomes in the legal process are inherently uncertain, a plaintiff that gets past the dismissal stage may be able to extort a costly settlement from a defendant without market power. The risk of bearing such costs may be sufficient to deter some firms from engaging in price discrimination altogether.

Indeed, the initiation of CSPD could have consequences that would make it more difficult for a defendant to "break the link" between market power and anticompetitive effects, even though that price discrimination intensified competition. CSPD causes prices and profits to fall for current market participants. If spatial competitors were in a zero (economic)

---

[78] 509 U.S. 209, 226 (1992) (internal quotation omitted).

[79] 124 S. Ct. 872 (2004).

[80] *Id.* at 882 (quoting *Matsushita*, 475 U.S. at 594).

[81] Baker, *supra* note 59, at 645.

profit equilibrium before engaging in discrimination, the reduction in profits will encourage exit, not entry. The coincidence of price discrimination and exit might, in markets with entry barriers, make it difficult to "break the link" between market power and anticompetitive effect in markets, even though exit is, in fact, a symptom of price discrimination intensifying competition.

## C. BAYESIAN ANALYSIS OF ERROR COSTS

We can use Bayes's theorem to analyze the usefulness of a decision rule that infers that a firm enjoys market power if it engages in price discrimination. Consider the following expression:

$$\frac{P(MP|PD)}{P(C|PD)} = \frac{P(PD|MP)}{P(PD|C)} \cdot \frac{P(MP)}{P(C)}, \tag{11}$$

where $MP$ and $C$ denote "market power" and "competitive" market conditions, respectively, and $PD$ denotes evidence that the defendant engages in price discrimination.

$P(MP|PD)$ is the probability that a firm that price discriminates possesses market power that justifies antitrust intervention. $P(C|PD)$ is the probability that a defendant that price discriminates faces competitive conditions. Thus, the left-hand side of this expression represents the odds that a firm has market power when we observe price discrimination, or the predictive value of using price discrimination as a screen for detecting whether a firm possesses market power. On the right-hand side, $P(PD|MP)$ is the probability of observing discrimination when the defendant possesses market power that justifies antitrust intervention, and $P(PD|C)$ is the probability of observing price discrimination in a competitive market. This latter expression is the Type-I error rate because $P(PD|C)$ is the probability that the decision rule—infer market power if we observe price discrimination—falsely rejects the null hypothesis that the market is competitive when in fact the market is competitive. Importantly, the predictive value of a price discrimination screen for market power is smaller the greater the Type-I error rate and the general prevalence of competitive market conditions.

Evidence of price discrimination will be a reliable indicator of whether a firm's conduct is likely to have anticompetitive consequences, only if observing that a firm discriminates increases the accuracy with which we can predict that the firm has market power. In other words, this test can be useful only if $\frac{P(MP|PD)}{P(C|PD)}$ (the ratio of the probability that a defendant that price discriminates has market power to the probability that a dis-

criminating defendant operates in competitive conditions) is greater than $\frac{P(MP)}{P(C)}$ (the ratio of the probabilities that any defendant, regardless of whether it discriminates, has market power, or operates in competitive conditions). Expression (11) above tells us this will be the case only if $\frac{P(PD|MP)}{P(PD|C)}$ is greater than one, which means a firm must be more likely to engage in price discrimination when it possesses the degree of market power that is a legitimate antitrust concern than when it operates in a competitive market. This makes sense. If firms with and without market power are equally likely to price discriminate, observing that a firm discriminates adds no information about whether a firm has market power that is an antitrust concern.[82] The more likely it is that firms in competitive markets discriminate, (i.e., the greater is $P(PD|C)$), the lower the value of $\frac{P(PD|MP)}{P(PD|C)}$ and the less likely it is that price discrimination provides useful information to fact finders that helps them reach accurate conclusions about the potential for anticompetitive effects.

The following numerical example illustrates the likely consequences of using price discrimination as a screen for market power when competitive firms also may discriminate. Suppose that most markets are competitive, so that the probability of a firm possessing market power in any meaningful sense is 5 percent. Hence: $\frac{P(MP)}{P(C)} = \frac{.05}{.95} = .052$. Further, assume that all firms that exist in noncompetitive markets engage in price discrimination, or $P(PD|MP) = 1$.[83] As we have shown, price discrimination occurs in competitive markets for a variety of reasons unrelated to a firm's ability to restrain competition. Accordingly, it may be reasonable to assume that firms in competitive markets are equally likely to discriminate and to set uniform prices, i.e., $P(PD|C) = .5$. Under these assumptions, price discrimination is twice as likely to be observed when the defendant has market power as when it does not (i.e., $\frac{P(PD|MP)}{P(PD|C)} = 2$). Nevertheless observing that a firm price discriminates provides insufficient new information to make price discrimination an accurate indicator that the firm has market power.

---

[82] Indeed, the premise underlying the logic of using price discrimination as a screen for market power is that $P(PD|C) \approx 0$. If this were truly the case, Type-I error would be zero, and all incidences of price discrimination would indicate market power.

[83] This is surely an overstatement if only because price discrimination will not always be possible. In this way, the example may understate the likely incidence of error in applying a price discrimination screen for market power.

The information that a firm price discriminates increases by only about 5 percentage points the likelihood that it has market power significant for antitrust enforcement, and there is only a 10 percent probability that a firm that price discriminates possesses meaningful market power $\left(\dfrac{P(MP)}{P(C)} = \dfrac{.05}{.95} = .052 \quad \text{and} \quad \dfrac{P(MP|PD)}{P(C|PD)} = .104{<}1\right)$.[84] Moreover, $\dfrac{P(MP|PD)}{P(C|PD)} = .104$, means the rule that price-discriminating firms have market power is right only about 10 percent as often as it is wrong. Many more innocent firms than truly culpable firms are found to have market power and, thus, to be in danger of antitrust liability. Maintaining the assumption that all firms with market power discriminate $(P(PD|MP) = 1)$, the conclusion that a price-discriminating firm has market power will be correct more than half the time only if the probability that competitive firms discriminate $(P(PD|C)$, or the Type-I error rate) is smaller than the prior odds ratio that firms have market power or are competitive $\left(\dfrac{P(MP)}{PC)}\right)$.[85]

As long as anticompetitive market conditions are relatively rare but price discrimination in competitive markets is more than rare—which it is—we can expect a price discrimination test to produce more erroneous than correct findings of market power. The cost of such errors is the social value of the behavior they deter.

If evidence of price discrimination will allow a plaintiff to at least get past dismissal in an antitrust suit, we can expect firms to be hesitant to engage in price discrimination in the first place. If the consumer welfare effects of price discrimination were ambiguous, the consumer welfare effects of a rule that deterred price discrimination also would be ambiguous. The consumer welfare effects of price discrimination by a monopolist are ambiguous. If, however, the legal inference of market power from price discrimination induces spatial competitors to charge a uniform price to insulate themselves from the possibility of facing treble damages in an antitrust suit, the result may be less competition, rather than more. Where market conditions would lead to CSPD, the costs of Type-I error— falsely inferring market power from price discrimination—are substantial because consumers would *unambiguously* benefit from price discrimination.

---

[84] $.104 - .052 = .052$.

[85] $\dfrac{1}{P(MP|C)} \cdot \dfrac{P(MP)}{P(C)} > 1 \Rightarrow P(MP|C) < \dfrac{P(MP)}{P(C)}$. Of course, the Type-I error rate must be even smaller for this condition to obtain if not all firms with market power discriminate.

Ironically, a rule allowing market power to be inferred from price discrimination may help spatial competitors solve the prisoner's dilemma that arises because each has a unilateral incentive to compete with discriminatory prices even though they all would benefit by agreeing to charge uniform prices. The rule gives each spatial competitor a unilateral incentive to avoid discriminating and to charge uniform prices in order to reduce the risk of antitrust liability. Thus, the rule could allow spatial competitors to achieve unilaterally the same competition-reducing outcome—setting uniform prices—they would collude to enforce if the antitrust laws permitted it.

The courts should not allow plaintiffs to use evidence of price discrimination to make out an antitrust case for the same reason that the Supreme Court has moved away from per se rules and is correctly mindful in its Section 2 jurisprudence not to fashion rules that "might chill competition, rather than foster it."[86] Not only is price discrimination a common tool for firms in all sorts of competitive markets, CSPD leads to more intense competition than would uniform pricing. As with rules that deter competitive price cutting, rules that discourage CSPD risk deterring a "mechanism by which a firm stimulates competition."[87]

## V. ROBINSON-PATMAN

The analysis of competitive spatial price discrimination has similar important implications for the welfare costs of secondary-line Robinson-Patman enforcement. The analysis above must be applied cautiously to RP enforcement because secondary-line RP is concerned only with discriminatory prices of upstream suppliers to downstream firms that compete, not with discriminatory prices to end consumers.[88] Unlike the firms selling to consumers analyzed earlier, competing upstream suppliers may face interdependent demands for the common upstream input they supply. Therefore, discriminatory pricing by an upstream

---

[86] *Spectrum Sports*, 506 U.S at 458.

[87] Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209, 226 (1992) (quoting Cargill Inc. v. Monfort of Colo., Inc., 479 U.S. 104, 122 n.17 (1986)).

[88] To make out a secondary-line price discrimination claim under Robinson-Patman, a plaintiff must show: "(1) that seller's sales were made in interstate commerce; (2) that the seller discriminated in price as between the two purchasers; (3) that the product or commodity sold to the competing purchasers was of the same grade and quality; and (4) that the price discrimination had a prohibited effect on competition." Chawla v. Shell Oil Co., 75 F. Supp. 2d 626, 645 n.22 (S.D. Tex. 1999) (internal quotation omitted). "As a prerequisite to establishing 'competitive injury,' a plaintiff must prove that 'it was engaged in actual competition with the favored purchaser(s) as of the time of the price differential.'" *Id.* at 650 (quoting George Haug Co. v. Rolls Royce Motor Cars, Inc., 148 F.3d 136, 141 (2d Cir. 1998)).

supplier to downstream competitors may have different welfare effects than discriminatory pricing to consumers by a downstream firm.[89] Nevertheless, our model is relevant where the downstream firms being charged discriminatory prices are retailers that are differentiated because their patrons have different tastes. For example, a grocery store may be located in a geographic region where residents have distinct tastes, or specialty book or record stores may cater to consumers with specific tastes, allowing retailers' preferences to be ordered in a manner consistent with the conditions sufficient for CSPD to exists.

The model's implications for the social costs of RP enforcement do not involve the issue of type-I error, of incorrectly inferring market power from price discrimination. The Act has no anticompetitive effect requirement; price discrimination that fulfills the requirements of the statute is condemned.[90] A Robinson-Patman plaintiff merely needs to show that as a disfavored purchaser it was injured. The issue is simply whether the price discrimination that is condemned, and presumably sometimes deterred, is welfare enhancing or reducing.

That the Robinson-Patman Act's deterrence of price discrimination is often welfare reducing is not a new insight.[91] Many critics point out

---

[89] Consumers' demands typically are independent. *See* O'Brien, *supra* note 17; Daniel P. O'Brien & Greg Shaffer, *The Welfare Effects of Forbidding Discriminatory Discounts: A Secondary Line Analysis of Robinson-Patman*, 10 J.L., ECON. & ORG. 296 (1994); Katz, *supra* note 17.

[90] *See* George Haug Co. v. Rolls Royce Motor Cars, 148 F.3d 136, 143–44 (2d Cir. 1998) (no need to show harm to competition for purposes of price discrimination under Robinson-Patman Act); Chroma Lighting v. GTE Products Corp., 111 F.3d 653, 655 (9th Cir. 1997) (same); Alan's of Atlanta, Inc. v. Minolta Corp., 903 F.2d 1414, 1418 n.6 (11th Cir. 1990) (same); J.F. Feeser v. Serv-A-Portion, 909 F.2d 1524, 1533 (3d Cir. 1990) (same). *But see* Great Atl. & Pac. Tea Co. v. FTC, 440 U.S. 69, 80 n.13 (1979) (Robinson-Patman Act "should be construed consistently with broader policies of the antitrust laws"); Boise Cascade Corp. v. FTC, 837 F.2d 1127, 1144–48 (D.C. Cir. 1988); Richard Short Oil Co. v. Texaco, Inc., 799 F.2d 415, 420 (8th Cir. 1986) ("The Act refers not to the effect upon competitors, but to the effect upon competition in general. . . . [A]nalysis of the injury to competition focuses on whether there has been a substantial impairment to the vigor or health of the contest for business, regardless of which competitor wins or loses."); Motive Parts Warehouse v. Facet Enters., 774 F.2d 380, 395 (10th Cir. 1985) ("[T]he naked demonstration of injury to a specific competitor without more is not sufficient to show that price discrimination may substantially lessen competition; the test must always focus on injury to competition.") (internal citations and quotations omitted); Bob Nicholson Appliance, Inc. v. Maytag Co., 883 F. Supp. 321, 326 (S.D. Ind. 1994) (extending the reasoning of *Brooke Group* to secondary-line actions and "requir[ing] actual injury to competition"). HERBERT HOVENKAMP, ANTITRUST LAW ¶ 2342d (1999) ("*Brooke Group*'s strictures clearly apply to both [primary and secondary-line Robinson Patman Act actions]. . . .").

[91] *See, e.g.*, William E. Kovacic, *The Modern Evolution of U.S. Competition Policy Enforcement Norms,* 71 ANTITRUST L.J. 377, 413 (2003) ("Extensive, repeated criticism of the RP statute and enforcements patterns through the 1960s suggested that the consensus within the larger community of antitrust academics and practitioners favored retrenchment."); Her-

that the benefits of Robinson-Patman are uncertain because the welfare effects of a monopolist charging uniform rather than discriminatory prices are ambiguous.[92] As one antitrust treatise remarks: "it is difficult to predict whether price discrimination will result in higher output and lower prices or not. . . . . What this means for the Robinson-Patman Act is relatively simple . . . there is no certainty concerning the benefits of its enforcement."[93] A leading industrial organization textbook concludes that "[g]iven the ambiguous welfare effects of certain types of price discrimination, some economists question the desirability of a flat anti-trust prohibition against these forms of price discrimination."[94]

Although these arguments provide insight into the costs of Robinson-Patman enforcement applied to monopoly price discrimination, they are not relevant to the case of CSPD, which unambiguously results in more intense competition and lower prices than uniform pricing. Indeed, as discussed earlier, if firms were able to collude, they would choose to offer a uniform price. This means that, as with the case of using price discrimination to infer market power, the costs of Robinson-Patman also are likely to be greater than previously realized.

*National Association of College Bookstores v. Cambridge University Press* presents a possible example of a case in which RP enforcement may have condemned CSPD.[95] Here, a group of college bookstores brought a Robinson-Patman action against various publishers. The plaintiffs

---

bert Hovenkamp, *The Robinson-Patman Act and Competition: Unfinished Business*, 68 ANTI-TRUST L.J. 125 (2000); Marius Schwartz, *The Perverse Effects of the Robinson-Patman Act*, 31 ANTITRUST BULL. 733 (1986); Thomas W. Ross, *Winners and Losers Under the Robinson-Patman Act*, 27 J.L. & ECON. 243 (1984).

[92] *See supra* text accompanying note 17. As noted, this argument may not be correct given the analytical differences between price discrimination in final goods versus interme-diate goods markets.

[93] E. THOMAS SULLIVAN & JEFFREY L HARRISON, UNDERSTANDING ANTITRUST AND ITS ECONOMIC IMPLICATIONS 398 (2003). *See also* AREEDA & HOVENKAMP, 3 ANTITRUST LAW ¶ 721e (2d ed. 2002) ("In sum, price discrimination has ambiguous effects on consumer welfare and entry by competitors, and decrees enjoining price discrimination are even more ambiguous. There is little reason for believing that antitrust tribunals would be able to identify socially harmful instances or to devise decrees that would make markets more competitive.").

[94] DENNIS CARLTON & JEFFREY PERLOFF, MODERN INDUSTRIAL ORGANIZATION 307 (4th ed. 2005). Citing the ambiguous welfare effects of price discrimination, Judge Posner characterizes the argument that "price discrimination should be encouraged . . . because it is bound to result in an expansion of output over the level produced by a single price monopolist" as a "pseudo-objection." POSNER, ANTITRUST LAW, *supra* note 64, at 82–83. *See also* Baker, *supra* note 59, at 647 ("[T]he welfare consequences of price discrimination in general are ambiguous, whether the test is consumer welfare or aggregate welfare."). Klein & Wiley, *supra* note 1, at 612–13, concede that the welfare effects of third-degree price discrimination are ambiguous.

[95] 990 F. Supp. 245 (S.D.N.Y. 1997).

claimed that the publishers sold the same college textbooks to general retailers like Barnes & Noble and B. Dalton more cheaply than to college bookstores.[96] The court denied defendants' motions for dismissal and subsequently the parties agreed to a settlement.[97]

General and college bookstores can be thought of as customers that prefer different types of products because they serve different clientele. The clientele of college bookstores—predominately college students and professors—demand books of a more technical nature, while the clientele of general retail bookstores are more likely to demand best-sellers. In the context of our spatial competition model, one can imagine a line segment with publishers of technical books and journals—like the defendants in *National Association of College Bookstores*—located at one node and publishers of best-sellers at the other. The bookstores here are the customers, with college bookstores located closer in product space to publishers of technical books and general bookstores located closer to the publishers of general best-sellers.

By offering their textbooks at lower prices designed to compensate their general retail customers for the cost associated with consuming away from their most desired points, textbook publishers arguably were competing with publishers of more popular books for the bookstores located in "neighborhoods" close to general publishers. Consistent with this interpretation, one of the defendants stated that the discounts to consumer bookstores were "designed to induce these outlets to make available to the general public relatively specialized or academic books."[98] Robinson-Patman enforcement here clearly deprived customers who preferred best-sellers lower prices for more technical books.[99] In equilibrium, moreover, we would expect publishers of best-sellers to respond to this competitive threat by lowering the prices of their books to general retail

---

[96] *Id.* at 247–48. The publishers accomplished this price differential by offering smaller discounts for the same book when it was ordered for "classroom use." *Id.* at 248.

[97] *See* 2 PROF'L PUBL'G REP., No. 22, Nov. 20, 1998.

[98] *See* 1 PROF'L PUBL'G REP., No. 7, Aug. 15, 1997.

[99] There is no indication that the defendants increased price in their strong market (college bookstores), which would be consistent with monopoly price discrimination. The court notes that the discrimination scheme involved offering higher discounts to books purchased for non-classroom use, but there is nothing in the decision to suggest that the college bookstores had to pay more for technical books than they previously had. *See Nat'l Ass'n of College Bookstores*, 990 F. Supp. at 246–47. There is no information regarding prices charged by publishers of best-sellers to college bookstores; thus one can only conjecture as to whether best-seller publishers also would have attempted to offer discriminatorily low prices to these customers or whether technical publishers would be forced to respond to such an attempt by lowering their prices if the defendants were allowed to continue their pricing scheme.

bookstores.[100] Thus, by attenuating competition for these consumers, Robinson-Patman enforcement may have caused them to pay higher prices for best-sellers as well.

Because sophisticated firms generally consider the likelihood of antitrust liability prior to adopting pricing strategies, book publishers are likely to receive counsel based on this precedent and think twice before offering lower prices to customers in weaker markets. By creating incentives for firms to offer uniform prices, cases like this chill such future competition.

## VI. CONCLUSION

This article shows the important implications for antitrust policy of a well-known result in economics—that in certain cases price discrimination can cause firms to compete more intensely, leading to lower prices for all consumers and lower profits for all firms. Over the course of more than a hundred years of antitrust practice, price discrimination has erroneously come to be associated with excessive market power and anticompetitive intentions and effects. Why has this occurred? In elementary economics courses in universities throughout the world, students learn about perfectly competitive markets and monopoly. They are taught that perfectly competitive markets result in a price equal to marginal cost and that this outcome is efficient, while monopoly results in prices above marginal cost that are inefficient. Finally, they are taught that the antitrust laws exist to prevent monopoly and help ensure that markets are competitive and, hence, efficient.

What students often are not taught is that perfect competition is a theoretical limiting case that exists only in our imagination (although it may be approximated quite closely by certain commodity markets). Without the tools of oligopoly theory at their disposal, antitrust practitioners are like Procrustes, the mythological character who stretched or shortened his guests so that they would fit perfectly in his guest bed. For one hundred years, antitrust practitioners have attempted to understand oligopoly behavior using elementary models of perfect competition or complete monopoly, which simply do not fit. Rather than responding to the poor fit by finding a better model, however, they have

---

[100] There is no evidence that publishers of best-sellers had lowered their prices to general bookstores in response to the defendants' price reductions for technical books. However, one can conjecture that had the defendants' pricing scheme been allowed to continue legally, that publishers of best-sellers would have offered general retail bookstores discounts on best-sellers that were most likely to compete with technical books—for example, non-fiction history or science.

responded by forcing the oligopoly behavior they observe to fit into the elementary models of perfect competition and monopoly.

Without a "bed" that accommodates it, the practitioner's antitrust framework distorts oligopoly behavior into misleading shapes and appearances that yield erroneous implications, such as "the presence of price discrimination is a good indication of monopoly." The situation will not improve until practitioners recognize that they cannot use implications from the theoretical fictions of perfect competition and monopoly to draw inferences about the competitiveness of markets that have any relevance for antitrust.

# APPENDIX

This appendix explains how premerger and post-merger prices are determined in the triangular city model when firms cannot engage in price discrimination.

*Premerger Prices with No Price Discrimination*

Consider first the premerger situation. Each firm chooses price to maximize its profits given the prices chosen by the other firms. A firm's profit at any given set of prices depends on the demand for its product, so we must first determine how demand varies with prices. Firm 1 will sell to all customers for whom the *full price* of buying from Firm 1 is less than the full price of buying from Firms 2 or 3. Consider the decision of a customer located $d$ miles from Firm 1 and hence $6 - d$ miles from Firm 2. If Firm 1 charges the price $P$, the full price for product 1 to this customer is $P_{Full} = P + td$. If Firm 2 charges the price $P_{Rival}$, the full price for product 2 for this customer is $P_{Rival,Full} = P_{Rival} + t(6 - d)$. This customer is just indifferent between purchasing from 1 or 2 if $P_{Full} = P_{Rival,Full}$, or if

$$P + td = P_{Rival} + t(6 - d). \tag{A1}$$

Solving (A1) for $d$ gives the distance $\hat{d}$ of the customer just indifferent between buying from Firm 1 or Firm 2:

$$\hat{d} = \frac{P_{Rival} - P}{2t} + 3. \tag{A2}$$

Firm 1 will sell to all customers located between itself and Firm 2 who are within $\hat{d}$ miles.

Because the triangular city is symmetric, it turns out that Firm 1's rivals all have the same incentives. So suppose Firm 3 charges the same price as Firm 2, i.e., $P_{Rival}$. Then Firm 1 will sell to all customers between itself and Firm 3 who are within $\hat{d}$ units of Firm 1. So when Firm 1's rivals both charge the price $P_{Rival}$, the demand $D$ for Firm 1's product is twice $\hat{d}$, or

$$D = 2\hat{d} = \frac{P_{Rival} - P}{t} + 6.^{101} \tag{A3}$$

---

[101] We have normalized the number of customers per mile to one.

371

Firm 1 will choose its price $P$ to maximize its profits given its rivals' prices. Firm 1's profits $\pi$ are

$$\pi = (P - c)D = (P - c)\left[\frac{P_{Rival} - P}{t} + 6\right]. \tag{A4}$$

The first order condition for profit maximization is

$$\frac{\partial \pi}{\partial P} = \left[\frac{P_{Rival} - P}{t} + 6\right] - \left(\frac{P - c}{t}\right) = 0. \tag{A5}$$

Using the symmetry of the situation once again, we know that Firm 1's rivals have the same incentives as Firm 1 in choosing their prices. This means that when all firms are choosing price optimally, $P = P_{Rival}$, i.e., the Nash equilibrium will be symmetric. Setting $P = P_{Rival}$ and solving equation (A5) for $P$ gives the premerger uniform price,

$$P = c + 6t. \tag{A6}$$

This is the premerger uniform price reported in the text.

*Post-Merger Prices with No Discrimination*

Next, we consider pricing incentives following a merger between Firms 1 and 2 in the triangular city model. Denote the prices for products 1 and 2 as $P_{Merged}$; because of the symmetry of the triangular city, the merged firm will charge the same prices for products 1 and 2. Continue to denote the rival firm's price as $P_{Rival}$. Given the prices $P_{Merged}$ and $P_{Rival}$, the merged firm will sell to all customers located between products 1 and 2, and it will sell to all customers within $\hat{d}$ miles of Firm 3 along Routes 13 and 23. Denoting the demand for the merged firm's products as $D_{Merged}$, this demand is

$$D_{Merged} = 6 + 2D = 12 + \frac{P_{Rival} - P_{Merged}}{t}. \tag{A7}$$

The merged firm's profit is therefore

$$\pi_{Merged} = (P_{Merged} - c) \left[12 + \frac{P_{Rival} - P_{Merged}}{t}\right]. \tag{A8}$$

The merged firm's first order condition for profit maximization is

$$\frac{\partial \pi_{Merged}}{\partial P_{Merged}} = \left[12 + \frac{P_{Rival} - P_{Merged}}{t}\right] - \left(\frac{P_{Merged} - c}{t}\right) = 0. \tag{A9}$$

Firm 3's decision calculus is the same as it was prior to the merger. Its first order condition for profit maximization is given by (A5) after replacing $P$ with $P_{Rival}$ and $P_{Rival}$ with $P_{Merged}$. This gives

$$\frac{\partial \pi}{\partial P} = \left[\frac{P_{Merged} - P_{Rival}}{t} + 6\right] - \left(\frac{P_{Rival} - c}{t}\right) = 0. \qquad \text{(A10)}$$

The post-merger Nash equilibrium uniform price is given by the simultaneous solution to equations (A9) and (A10). It is straightforward to confirm that the solution is

$$P_{Merged} = c + 10t, \qquad P_{Rival} = c + 8t, \qquad \text{(A11)}$$

which are the post-merger uniform prices reported in the text.